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**DIRECTING LEARNING
IN THE
HIGH SCHOOL**

TEACHER TRAINING SERIES

WALTER S. MONROE, GENERAL EDITOR

* * *

MONROE: DIRECTING LEARNING IN THE HIGH SCHOOL

MONROE AND DeVoss: EDUCATIONAL PSYCHOLOGY (*in preparation*)

MONROE AND WEBER: THE HIGH SCHOOL (*in preparation*)

DIRECTING LEARNING IN THE HIGH SCHOOL

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PREFACE

THIS volume is a product of the author's experience in giving instruction in methods of teaching and in several other phases of the field of education. This experience has been supplemented by an extended study of the courses for the professional training of teachers in a large number of institutions.¹ The scope of the volume and the general point of view is described in the first chapter and hence need not be given here. The underlying philosophy is eclectic. An effort has been made to present a coherent exposition of the basic principles of teaching as represented by the best of our educational thinking and practice.

In view of the fact that a large number of texts on methods of teaching are available, the publication of a new one requires justification. The recent contributions of educational research probably are sufficient to justify the appearance of a text that makes the results of investigations more accessible to prospective teachers. As will be apparent to the reader, the author has made use of the products of many studies and it is hoped the presentation of these represents a contribution in the field of teacher training. However, in the judgment of the author, there is a more significant justification for the publication of this volume.

In addition to being a treatise on methods of teaching, this volume is one unit of a coördinated series of texts

¹MONROE, WALTER S. "The Undergraduate Curriculum in Education," *School and Society*, 24: 177-81, August 7, 1926.

in the field of education. For the most part our texts for the three basic courses in the training of secondary teachers—educational psychology, methods of teaching, and principles of secondary education—have been prepared by three groups of writers working independently. Texts on educational psychology have been written by specialists in that field who gave little consideration to the content of texts on methods of teaching; writers in the field of methods have not articulated their texts with those on educational psychology and have exhibited considerable variation in the selection of the topics treated as well as in the elaborateness of treatment; the authors of texts dealing with the principles of secondary education and its organization have invaded both educational psychology and methods of teaching and also have introduced technical administrative topics. Considered separately, a number of the texts possess much merit, but frequently a combination of texts selected for the basic courses exhibits undesirable overlapping in content as well as disturbing variations in terminology and points of view.

The author of this volume—*Directing Learning in the High School*—is also the co-author of the companion texts on educational psychology and principles of secondary education. The scope of each of the three texts as well as the boundaries between them are arbitrary, but the determinations were made after an extended study of the questions involved. There is some overlapping, but some recurrence of topics is desirable. The student needs to connect fundamental concepts and principles. Dynamic knowledge is organized knowledge. On the other hand, indiscriminate overlapping and recurrence is to be condemned and the author believes this has been avoided. In all cases the recurrence of a topic has been planned to fulfill a definite

function. Some topics are treated in two of the volumes and a few in all three, but the discussions tend to be complementary rather than duplications. The authors have endeavored to be consistent in the use of technical terms and to conform to the same general philosophy of education.

Although this volume is intended to represent a unit in a coördinated series, the author has endeavored to make its content such that it may be used in conjunction with other texts on educational psychology and principles of secondary education. References have been made to most of those which are widely used.

The field of methods of teaching includes many topics. Although some grouping is possible, considerable separation is necessary in a text. The students' comprehension, however, should be unified. In order to facilitate the attainment of this objective this volume has been divided into only seventeen chapters. Hence when used as a text for a semester course of three hours, the student's attention will be focused upon the same general topic for approximately one week. Furthermore, Chapters VI to IX and Chapters XI to XIV are divisions of larger units. Numerous cross references are intended to assist the reader in organizing what he learns about methods of teaching, and the final chapter on lesson planning affords the opportunity for a review and application of the preceding chapters.

The reader will observe that the author is heavily indebted to many writers. In addition to the contributions for which specific acknowledgment is made, he is indebted to such writers as Bagley, Charters, Dewey, Parker, and Thorndike for general stimulation and guidance in his thinking. He also acknowledges his indebtedness to the

members of his classes who have stimulated his thinking and who have afforded opportunities for trying out the discussion of various topics, and to his colleagues who have offered criticisms and suggestions. Specific mention should be made of Mrs. Charles Hughes Johnston who read a preliminary draft critically and who contributed a number of the learning exercises; and of Dr. O. F. Weber, University of Illinois, and Dr. J. C. DeVoss, State Teachers College, San Jose, California, who have read the entire manuscript. To Lula R. Monroe the author owes much for encouragement and for labor in preparing the manuscript.

WALTER S. MONROE.

Urbana, Illinois,
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CONTENTS

CHAPTER	PAGE
I. INTRODUCTION	1
II. LEARNING EXERCISES	23
III. TEACHERS' OBJECTIVES	51
IV. MOTIVATING THE DOING OF LEARNING EX- ERCISES	85
V. DIRECTING THE FORMATION OF SPECIFIC HABITS; MOTOR SKILLS AND FIXED AS- SOCIATIONS	115
VI. DIRECTING THE ACQUIRING OF KNOWLEDGE THROUGH EXPERIENCE AND DEVELOP- MENT	147
VII. DIRECTING THE ACQUIRING OF KNOWLEDGE THROUGH READING	191
VIII. DIRECTING THE ACQUIRING OF KNOWLEDGE THROUGH ITS USE	238
IX. DIRECTING THE ORGANIZATION AND EXPRES- SION OF KNOWLEDGE	280
X. DIRECTING THE ACQUISITION OF GENERAL PATTERNS OF CONDUCT	313
XI. THE MANAGEMENT OF CLASSES	342
XII. ADAPTING INSTRUCTIONAL PROCEDURES TO INDIVIDUAL DIFFERENCES.	377

CHAPTER	PAGE
XIII. DIRECTING AND SUPPLEMENTING LEARNING ACTIVITY OUTSIDE OF THE RECITATION PERIOD	405
XIV. DIRECTING LEARNING ACTIVITIES ORGAN- IZED AS PROJECTS	446
XV. MEASUREMENT OF ACHIEVEMENT, GENERAL PRINCIPLES	473
XVI. THE IMPROVEMENT OF MEASUREMENT PRO- CEDURES	501
XVII. THE PLANNING OF TEACHING	539
INDEX OF AUTHORS AND TOPICS	571

DIRECTING LEARNING
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CHAPTER I INTRODUCTION

What should one learn from the study of methods of teaching?—The following chapters of this volume represent an attempt to answer this question in detail, but it may be noted here that probably the most important item of this phase of the teacher's professional equipment is a concept of the learning process that will function as a pattern for his thinking about questions relating to instructional procedures. This concept should be supplemented by a clear understanding of the nature of the teacher's task.

The learning process characterized by activity.—From the standpoint of the problems of methods of teaching, the most significant characteristic of the learning process is the activity of the learner.¹ Children acquire motor skills, memorized facts, knowledge, ideals, and other controls of conduct as the result of perceiving, thinking, doing, and feeling. A child's mind is not a blank tablet on which the teacher may directly write the things which he wishes

¹This characteristic of learning is emphasized by: BAGLEY, W. C., and KEITH, J. A. H.—*An Introduction to Teaching*. New York: The Macmillan Company, 1924, p. 28 f. PARKER, S. C.—*Methods of Teaching in High Schools, Revised Edition*. Boston: Ginn and Company, 1920, Chapter XII.

the child to learn. The child educates himself by participating in such activities as reading textbooks, doing exercises in algebra, solving problems, writing themes, listening to explanations by the teacher, observing what goes on about him, describing what he has done or seen, answering questions orally, asking questions, writing examination papers, making a chair in the shop, preparing a meal in the laboratory, playing in the school orchestra, and listening to concerts and other entertainments. It is only through engaging in such activities that the child learns. The teacher cannot communicate skills, ideas, facts, principles, and ideals directly to the student; knowledge is not transferred from a textbook to the learner's mind. Learning is a process of growth. The child is not something to be moulded by the application of external pressure, but is rather a living thing whose mental growth is to be directed largely by the school.

The preceding paragraph is not presented as a definition of the learning processes, but rather to provide a point of view which will be maintained throughout the following chapters. The reader should endeavor to master this point of view, which is sometimes referred to as the "principle of self-activity in learning," because it furnishes the only rational basis for the consideration of problems relating to instructional procedures. The principle of self-activity is generally accepted in theory but not infrequently it is violated in practice.² Our pedagogical vocabulary includes many words and phrases whose meanings retain traces of the concept of learning as a passive process in which the teacher rather than the pupil is the active agent. It is not

¹The principle of self-activity is not a new concept but its present acceptance is due largely to Froebel (1782-1852), Francis W. Parker (1837-1902), and John Dewey (1859-).

unusual to read that a teacher "imparts" knowledge and is responsible for "making his subject interesting," that he is expected to "explain" or "demonstrate," that his function is to "communicate" what he knows to his students, that the teacher "adds new knowledge," that the teacher must "prepare" his students for a new topic and then conform to certain principles in "presenting" it. Even such terms as subject-matter, content, textbook, and curriculum are frequently used in a way which implies that learning is at best a process of passive absorption. It is, of course, improbable that any person who has studied modern psychology would agree with these implications if asked explicitly concerning them, but contacts with students in education courses and with teachers have convinced the writer that the blank tablet theory of learning still functions in the thinking of many persons and in much of our educational practice.

The teacher's task.—The concept of the learning process as one in which the student is the active agent, should be supplemented by a clear understanding of the teacher's task as an instructor. If students learn only as the result of their own activities, what is the function of the teacher? The popular concept of the instructional duties of a teacher is indicated by the very general use of "recitation" as the name for the activities of the class period. Since this term is defined as "the rehearsal of a prepared lesson by the pupils before their instructor," the same concept of the teacher's task is expressed when teaching is described as "lesson hearing." Until recently this was a reasonably truthful description and even to-day the activities of many teachers do not extend much beyond the hearing of lessons.

The history of educational practice, especially since

1890, reveals a number of attempts to replace "lesson hearing" by a more efficient instructional procedure,¹ and gradually there has been built up a concept of the teacher's task which is epitomized by saying he is responsible for stimulating and directing children in appropriate learning activities. The teacher's activities in planning recitations or lectures, in conferences with his students, during the periods of recitation or study, and in measuring the achievements of his students are only means to these ends.²

The phrase "appropriate learning activities" is significant in determining the meaning of this description of the teacher's task. It is not sufficient to secure any sort of student activity. Two general classes of activities are inappropriate: first, activities that result in the acquisition of wrong habits and other undesirable controls of conduct, and second, those that represent inefficient learning. For example, the memorization of pages of a textbook in history is generally considered an inefficient learning activity because ability to repeat from memory extended passages is not often a valuable control of conduct. A critical analysis of a literary masterpiece is generally considered an inappropriate learning activity for high-school students. Listening to a formal lecture by the teacher is also generally condemned on the ground that children seldom learn much from participating in it.

Participation in learning activities is secured in two

¹Some of the more significant attempts are commonly referred to by the following titles: object teaching, development method (Herbartian five formal steps), topical method, unprepared lesson, laboratory method, socialized recitation, and project method. See Index for references to descriptions of these procedures.

²"The educator's part in the enterprise of education is to furnish the environment which stimulates responses and directs the learner's course." DEWEY, JOHN—*Democracy and Education*. New York: The Macmillan Company, 1916, p. 212.

ways: (1) by assigning exercises, and (2) by discovering what students want to do and guiding their efforts to do these things so that they will engage in appropriate learning activities. The latter procedure is known as the "project method" and the first one may be designated as the "assignment method." In the following chapters it is assumed that most of the educative activity of high-school students is based on assigned exercises.¹ A teacher's success as an instructor depends upon his skill and judgment in devising appropriate learning exercises fully as much as upon his skill in carrying out the subsequent phases of instruction. If one seeks the causes of cases of poor classroom teaching, frequently he will find that a fundamental reason for the condition is the failure of the teacher to assign appropriate learning exercises. He either omits assignments, or assigns only indefinite and general exercises.

After appropriate learning exercises have been devised or selected, the teacher is responsible for stimulating and guiding his students in doing them. It should, however, be noted that "guiding" students does not mean making school work easy. Sometimes direct assistance may be given to the students, but in so far as the elimination of difficulties is accompanied by a lessening of student activity, a teacher hinders rather than facilitates learning. On the other hand, the efficient teacher guides the learner by questions, suggestions, and illustrations so that his efforts will be expended profitably. This does not mean that the learner should be guided so that he will never make a

¹Authorities in the field of methods of teaching do not agree in regard to the relative efficiency of these two general instructional procedures. See Chapter XIV for the discussion of this question. Some experimental evidence in favor of the "assignment method" is furnished by: GATES, A. I.—"A Modern Systematic versus an Opportunistic Method of Teaching," *Teachers College Record* 27: 679-700, April, 1926.

mistake. Sometimes we learn more from our failures than we do from our successes.

Phases of stimulating and directing learning.—The “stimulation and direction of learning activity” which forms the central topic of the following chapters includes the following phases:

- I. Devising and selecting appropriate learning exercises.
- II. Assigning these exercises.
- III. Motivating the doing of them.
- IV. Giving advice and suggestions to students in regard to doing the assigned exercises.
- V. Evaluating (testing) student achievements.
- VI. Devising and assigning supplementary learning exercises when the evaluation reveals unsatisfactory conditions.
- VII. Giving direct assistance when justified.

In the accomplishment of these tasks the teacher asks questions; he answers questions asked by the students; he explains the meaning of words; sometimes he gives a model solution of a problem; he demonstrates how things should be done in the laboratory and shop; he marks written work; he reproves students who are disorderly or negligent; and he commends students who have done well. In the accomplishment of these and all the other things which a teacher does, he employs certain procedures or techniques of teaching. In order to be successful a teacher must become skilful in the application of these techniques and also must learn to do the right thing at the right time.

Related phases of the teacher's task.—Although the analysis of the teacher's task just given emphasizes the central phases, there are certain additional items that deserve mention. It is important that the teacher become

acquainted with the general mental and emotional traits of the students he is instructing. This topic is one of the important problems of educational psychology, a basic course in the training of teaching. For this reason it will receive only incidental consideration in the following chapters of this volume.¹

It is essential that the teacher have a clear understanding of what his students should learn in the field of the subject in which he is instructing. In the absence of clearly defined objectives, the teacher's efforts to stimulate and direct learning activity are not likely to be efficient. A phase of educational objectives will be considered in Chapter III, but an extended treatment of what high-school students should learn in the different subjects would take us outside the field of methods of teaching.²

If learning is to take place on a high level of efficiency, it is necessary that order be maintained in the classroom, that the temperature, ventilation, and lighting be looked after, that apparatus and other materials be secured and properly cared for, and that a course of study be planned and textbooks selected. These things, however, are only prerequisites for the fundamental work of the teacher, the stimulation and direction of students in the doing of ap-

¹In case the reader has not had a course in educational psychology he will find it helpful to become familiar with a text in this field. *Educational Psychology* by MONROE, WALTER S., and DE VOSS, JAMES C., has been written as a companion to this volume on methods of teaching. Other standard texts on educational psychology are: GATES, ARTHUR I.—*Psychology for Students of Education*. New York: The Macmillan Company, 1923, 489 pp. THORNDIKE, EDWARD L.—*Educational Psychology*, Briefer Course. New York: Teachers College, Columbia University, 1914, 442 pp. CAMERON, EDWARD H.—*Psychology and the School*. New York: The Century Company, 1921, 339 pp. STARCH, DANIEL.—*Educational Psychology*, New York: The Macmillan Company, 1919, 473 pp.

²The reader will find a comprehensive treatment of the objectives of the high school in: MONROE, WALTER S., and WEBER, OSCAR F.—*The High School*. Garden City, N. Y.: Doubleday, Page and Company (to be published).

appropriate learning exercises. In making the preceding statement and in subordinating the consideration of classroom management in the following chapters, the author does not intend to imply that a teacher should consider this phase of his task relatively unimportant. On the contrary, it is very important. In fact, it has been stated frequently that more teachers fail to achieve success as teachers because they are weak in the management of their classes than for any other single reason. On the other hand, merely managing a class well does not constitute good teaching.¹

Stimulating and directing learning not a mechanical procedure.—Although the teacher's task has been described in terms of certain activities, it is not in any sense a mechanical procedure. Certain aspects of teaching such as the seating of a class, taking the roll, distributing and collecting materials, marking written work, and the like may appropriately be mechanized; but for the most part the teacher is constantly required to make decisions in regard to what to do and when to do it. We describe the teacher who has mechanized his work by saying that "he has gotten into a rut."

The problem of class instruction.—In our high schools students are assembled in classes, sometimes including thirty or more members. In general, the students who are grouped together for instructional purposes differ in ability to do the learning exercises that the teacher assigns. Some will be able to do them rapidly and with relatively little effort; others will find them difficult; and still others may not be able to do the more difficult. Furthermore, the students will differ with respect to their interest in school work. Some will be immediately interested in doing the

¹See Chapter XI for the explicit treatment of classroom management.

learning exercises assigned; others will be indifferent or even hostile and the teacher will find it difficult to stimulate effective participation in school work. Some students will profit greatly from the doing of a given learning exercise; others will learn little from the experience. Thus the handling of students in groups necessarily complicates the teacher's task. It is necessary that he adapt his teaching procedures to the needs and characteristics of the various members of his class, even though he is compelled by the organization of his school to work with the group as a whole most of the time.¹

Teacher activity versus activity of the learner.—We have already pointed out that learning is an active process and that the activity of the teacher is only for the purpose of stimulating and directing students in doing appropriate learning exercises. The things which the teacher does (teacher activities) and the things which students do in learning (student activities) are frequently confused. This is indicated by the erroneous use of "learn" for "teach" in such expressions as, "The teacher did not learn the children anything." This statement does not mention student activity and implies that what children learn is directly dependent upon the activity of the teacher. This implication, which appears to be involved in the thinking of many persons,² is opposed to the principle of self-activity stated at the beginning of this chapter.

In considering the problems of instruction it is highly important that there be at all times a clear distinction between these two types of activity. The things which the teacher does are merely for the purpose of stimulating and

¹The explicit treatment of adapting instruction to individual differences is deferred until Chapter XII.

²For example, see the statements of aims quoted from Colvin in Chapter XVII.

directing the learner and are not ends in themselves. The student can learn only as a result of his own activity. Furthermore, the things which the teacher should do are very different from the things which a learner must do.

In the following chapters of this book we shall be primarily concerned with the procedures and techniques of teaching (teacher activity), but, of course, we shall find it necessary to have a clear understanding of the learning process (student activity) in order to make our consideration of teaching procedures something more than superficial. Hence, the discussion at times may relate to the activity of learning but this will be for the purpose of providing a rational basis for considering teaching techniques.

General methods versus special methods.—Learning exercises in algebra differ in many respects from those in history. They differ even from those in geometry. Learning exercises in a foreign language are not like those in a laboratory science or in a course in manual training. Since such differences exist, many of the details of the task of a teacher of one high-school subject will differ in a number of respects from those of a teacher of another subject. For this reason some writers on methods of teaching have expressed the conviction that the consideration of teaching in high schools should be taken up in separate "courses in special methods" rather than in a general course. According to this proposal a prospective teacher would study the techniques of teaching only in one or more special methods courses, each of which deals with the teaching of only one high-school subject. He would not take a course in general methods such as this text is designed for. However, the general practice in teachers' colleges and departments of education is to require a course in general methods which

is supplemented later by one or more special methods courses in those subjects that the student is preparing to teach.

The writer's position on this question is in agreement with the prevailing practice. Although there are many details of teaching which are determined by the nature of the subject taught, there are certain fundamental principles which are applicable to all teaching. These general principles can be most effectively studied in a general course and the prospective teacher has a better opportunity to acquire fundamental points of view with reference to the work of the school. He needs these points of view to guide him, particularly when his stock of special methods and devices proves inadequate. There is also a need for a general methods course to furnish a common element of training for teachers of different subjects. The teaching staff of a high school is engaged in a coöperative enterprise, not in the independent teaching of a number of separate subjects. Since prospective teachers are separated for training in their fields of specialization, it is important that opportunities for common training be retained. Finally many teachers are called upon to give instruction in one or more subjects for which they have not explicitly prepared during their period of training. An understanding of the fundamental principles of teaching will enable them to carry on such work much more efficiently than would be possible if a general methods course were not a part of their professional training.

The function of a treatise on methods of teaching.—It is the function of a discussion of "general methods" to present in a systematic order and with appropriate illustrations and explanations the important concepts, rules, and principles relating to the teacher's task. For the most part

we shall be concerned with concepts and principles rather than with specific rules which prescribe specific teaching procedures. As we have already pointed out, effective stimulation and direction of learning are not secured by a series of mechanical acts. Except for a few details it is not possible to specify exactly what a teacher should do. It is continually necessary for a teacher to make decisions in regard to his actions. In making these decisions the teacher should be governed by principles of teaching and learning as well as by the needs of the particular class and by the nature of the subject taught.

The distinction between the application of a "specific rule" and a principle may be illustrated in elementary algebra and in physics. The student learns a "specific rule"¹ for solving a quadratic equation by completing the square. This rule specifies the particular operations and manipulations of symbols necessary for obtaining the answer. The student who "knows the rule" knows what to do. It is not necessary for him to decide what to do next. If the equation involves literal coefficients he may encounter difficulty in performing a particular manipulation such as extracting the square root of the right-hand member of the equation, but from the standpoint of the total procedure of solving the equation he is not in doubt concerning what to do. An applied problem in physics presents a different situation. A knowledge of the principles or laws upon which the solution is to be based does not tell the student the particular mathematical operations which must be performed upon certain numbers in order to obtain the an-

¹This rule is "general" in the sense that it is applicable to *all* quadratic equations. It is "specific" in the sense that it prescribes the *exact* procedure to be followed in solving these equations.

swer. It is necessary for him to "think out" the plan of solution, i.e., he must decide what numbers are to be added, what ones are to be multiplied, etc.

Teaching is a problem-solving occupation. Hence, a treatise on methods of teaching cannot prescribe the exact procedures to be employed. It will be concerned with setting forth certain principles which should govern teaching and with providing adequate explanations and illustrations of them.

Scientific evaluation of methods and devices of teaching.—The application of "scientific methods" to the study of educational problems¹ is resulting in a rapidly increasing body of reliable evidence relative to the merits of various methods and devices of teaching. Although there is now a commanding body of such evidence, we are yet far from having a complete system of educational procedure which has been scientifically determined. In the preparation of this book the writer has endeavored to utilize the results of scientific investigations in so far as they pertain to the topics under consideration, but he is fully aware that the discussions are primarily the results of his own thinking which in turn has been influenced by the thinking of others who have written in this field.

The teacher who desires to maintain a high level of efficiency should endeavor to keep in touch with scientific investigations in his particular field of instruction and to make use of the findings that are reliable. The widespread interest in educational research and the increasing facilities for such work give promise of a more rapid progress in the scientific evaluation of educational procedures than

¹The phrase "scientific methods" is used as a name for procedures which seek to determine the truth.

has been made in the immediate past. Thus, a teacher who does not keep in touch with the results of such work is likely soon to find himself behind the times.

There is, however, need for a word of caution. It will be unfortunate if the time ever comes when teachers consider that teaching procedures have been so surely evaluated by scientific methods, that they no longer need to give thought to questions relating to the techniques they should employ in their task of stimulating and directing their students in appropriate learning activities. It will always be necessary for a teacher to think about his work and to endeavor to increase his efficiency from year to year. Furthermore, it now seems likely that scientific study of teaching will show that there are no "best" techniques of teaching. Observation of many teachers has suggested to the writer that a teacher's faith in his procedures is a very potent factor in determining his success.¹ If a teacher believes in a particular method or device and puts sufficient zeal into its use, he will usually succeed, even though the technique in general may not be a good procedure. Furthermore, it seems that an occasional change in one's methods tends to increase his interest in his work. If this is true, a prospective teacher should not look forward to the time when he may be able to settle down with a set of demonstrated procedures and employ them for the remainder of his teaching days. On the contrary, he should constantly seek out new procedures or attempt to introduce variations

¹A number of cases can be cited in support of this observation. Pestalozzi (1745-1827) and a number of his followers achieved "remarkable" results by using methods of teaching which are now generally recognized as being inefficient. "Scientific investigation" showed that the "incidental method of teaching spelling" yielded superior results but it is now generally agreed that it is successful only when the teacher believes in it and is diligent in utilizing all the opportunities that arise.

in his present methods, so that his work may have the spice of variety and novelty and not degenerate into a mechanical routine.

The training of prospective teachers.—Although it is frequently minimized and sometimes intentionally omitted in considering the training of teachers, an extended study of the subject or subjects to be taught is important. The prospective teacher should pursue several advanced courses, such as are usually provided for in the requirements for a major or minor in undergraduate study. More important than this he should know the subject that he teaches not only as a “good student,” i.e., one who receives high grades in college, but more comprehensively so that he be aware of the interrelations existing between the several divisions of the subject and also of the relation of it to the other subjects of the curriculum. Space does not permit an elaboration of this point but it may be noted that “advanced” courses in college are more frequently designed to prepare a student for further advanced study than for teaching in secondary schools.

The phase of a teacher’s training referred to in the preceding paragraph is usually designated as *academic* in order to distinguish it from his study of the learning process, methods of teaching, the function of the school, and other topics relating to the education of children. Training of the latter type is called *professional*.

Educational psychology and methods of teaching are fundamental in the professional training of teachers. A third basic course for high-school teachers, frequently called “Principles of Secondary Education,” deals with the objectives of the high school, its relation to the community and its organization as an educational institution. History of education, school administration, principles of

education, and special methods represent other professional courses.¹

Experience as a learner an asset to the teacher.—The prospective high-school teacher has been a learner in the elementary school and in the high school. He is continuing his learning in college. This experience as a learner is a valuable asset upon which a prospective teacher may draw in his study of many of the problems relating to the education of children. However, it should be noted that being a skilful learner will not necessarily make one a successful teacher. On the other hand, an inexperienced learner seldom becomes a skilful teacher.

Practice required for skilful teaching.—A person should not expect to become a skilful teacher merely by studying about the learning process, the school, and the technique of teaching. Practice also is required. During the period of professional training some practice may be obtained by teaching under expert supervision, but this phase of a teacher's training continues through his first years of practical experience. In order that this experience may be most helpful, it must be of the right sort. At all times the activity

¹The courses named in this paragraph represent only some of the "elementary" phases of the professional training of teachers. Before 1900 the offerings of a department of education or pedagogy seldom included more than "school management" "child study," and "philosophy of education." Frequently there was only a single course in "pedagogy." In 1897-1898 Teachers College, Columbia University, offered nine courses in general education, seven in special methods and eleven in the kindergarten department. By 1905-1906 the number of courses offered by this institution in general education had increased to nineteen. In 1924 Teachers College offered 203 different courses, a large portion of them being designed for graduate students. Although these figures give a somewhat exaggerated picture of the present extent of the field of education, it is apparent that even an exploration of the various phases of professional training would require much more time than an undergraduate student can devote to the study of education. For a comprehensive account of the development of education, see: KANDEL, I. L.—*Twenty-five Years of American Education*. New York: The Macmillan Company, 1924, 469 pp.

of the teacher should be in agreement with the principles relating to stimulating and guiding students in their learning. He should constantly endeavor to apply those procedures that will result in the most efficient learning on the part of his students and should frequently subject his work to analysis and criticism in order to strengthen any weaknesses discovered. Each year he should endeavor to teach better than the preceding year.

The scope and plan of the following chapters.—The several phases of a teacher's professional training are so closely related that it is difficult to set definite boundaries between them. For this reason courses in education are characterized by considerable overlapping. This is not an altogether undesirable characteristic, but excessive overlapping means waste. The writer has attempted to confine this volume rather closely to a treatment of problems relating to instructional procedures.¹ Reference to topics whose intensive treatment belongs in other courses has, of course, been necessary, but the discussion of them has been reduced as much as seemed wise. It has been assumed that a course based upon this book as a text will not constitute the total of any teacher's professional training. It is expected that the prospective high-school teacher will take also a course in educational psychology, one in "principles of secondary education," and one or more special methods courses.

The title, *Directing Learning in the High School*, indicates the limitations of the scope of this text. We shall be con-

¹This volume has been planned as one of a series of three texts dealing with the basic phases of the professional training of high-school teachers. The other volumes are: MONROE, WALTER S., and DE VOSS, JAMES C.—*Educational Psychology*. MONROE, WALTER S., and WEBER, OSCAR F.—*The High School*. These texts will be published soon by Doubleday, Page and Company, Garden City, N. Y.

cerned with the problem of instruction after the child has acquired considerable proficiency in the so-called tool subjects of reading, writing, arithmetic, spelling, and language. The degree of proficiency assumed is approximately that required for the completion of the work of the sixth grade. In other words, the instructional problems considered here are primarily those that arise in dealing with pupils who know how to read, how to write, how to spell, and how to express themselves in written or spoken language. The principal topics treated in the following chapters have been indicated in the exposition of the teacher's task. (See page 6) The general organization is shown by the table of contents.

A reader's objective in studying this text.—The following chapters have been written for the purpose of guiding and assisting a reader in arriving at a clear understanding of the task of teachers and the concepts, principles, and general rules that should govern the performance of the various phases of it in high schools.¹ A "clear understanding" of a principle cannot be defined in precise qualitative or quantitative terms. It may, however, be stated that ability to repeat from memory the statement of a principle is not sufficient evidence that it is understood. Neither is it certain evidence of a "clear understanding" when one explains a principle or gives illustrations of it. The only dependable evidence of a person's understanding of a principle is his ability to apply it in devising and selecting teaching procedures. Therefore, the reader should set as his objective the "ability to apply" the principles discussed in the following chapters.

In endeavoring to attain this objective the reader should

¹The term "high school" is used here and throughout the book as a general term to include both junior and senior high schools.

recall from his own experience as a student and from his observation of teaching illustrations of the application of the principles. He should also apply the principles in planning the teaching of definite lessons.¹ Assuming a particular class (an imaginary one if necessary) and particular topics to be taught, he should apply the principles in deciding what learning exercises to assign, devising learning exercises, planning the assignment of them, formulating rules and suggestions for the doing of them, and the like.

LEARNING EXERCISES FOR THE READER

[NOTE.—The reader should bear in mind that learning is an active process and that “merely reading” a text is not a very efficient learning activity because a “mere reader” tends to be passive rather than active. For this reason a number of exercises have been placed at the end of each chapter. The time devoted to the doing of these learning exercises is likely to be more profitably invested than an equal period spent in reading the text. The reader should remember, however, that the end to be achieved is not the mere doing of these exercises but a clear understanding of the ideas and principles set forth in the several chapters.]

1. Recall the teachers under whom you were most successful as a learner. These will not necessarily be the ones whom you liked best. Write down a list of the things they did, particularly those which caused you to learn. Compare this list of characteristics with the discussion of the “teacher’s task.”

2. As a student have you found direct assistance by the teacher helpful in learning? Have you ever wished that the teacher would give you a chance to answer a question or work out the

¹The topic of lesson planning is not formally considered until the last chapter of this text but the preparation of partial lesson plans may be taken up in connection with the study of the following chapters, particularly Chapters III to X inclusive. If this is done, Chapter XVII on lesson planning will serve as an excellent means of organizing and summarizing the work of the preceding chapters.

solution to a problem instead of telling you the answer? Have you profited most from learning exercises which were difficult and required that you "stretch yourself" to succeed or from those learning exercises which you found easy? Give reasons for your answers.

3. Give five illustrations to show the distinction between "teacher activities" and "learning activities." How do you account for the popular confusion of "learning" and "teaching"?

4. Explain the meaning of the following statement: "The teacher should know the subject he teaches, not only as a good student of it but more comprehensively in order to be aware of the interrelations existing between the several divisions of the subject and also of the relation of it to the other subjects of the curriculum."

5. It has been said that teaching is a "fascinating occupation." Do you think so? What reason can you give in support of this statement?

6. Is teaching a "profession"? Why? What are the essentials of a "profession"?

7. The following are a few of the technical terms used in discussing learning and teaching in this chapter: learning process, learning exercises, classroom instruction, professional training. Write out a definition or an illustration of each.

You will be handicapped in your study of "directing learning in the high school" if you do not become familiar with the technical vocabulary used. Make a list of all of the words and phrases occurring in this chapter which may be considered technical in the field of education and write out a definition or an illustration of each.

8. Give five illustrations which show that teaching cannot be a mechanized occupation.

9. A textbook in geometry gives the demonstrations of certain theorems. Other theorems are given as exercises and the student is asked to work out the demonstration. In your study of geometry did you learn more from reading demonstrations given by the author or from doing "original" exercises? Why?

10. "Sometimes we learn more from our failures than we do from our successes." Illustrate from your own experience failures that really proved successes. State in each case what you

learned from the failure and in what respect you considered it helpful.

11. Give four other illustrations, similar to the one described for algebra and physics, showing the distinction between the application of a specific rule and of a principle.

12. Explain the significance of the statement: "Teaching is a problem-solving occupation."

13. In thinking over your own high-school teachers do you recall one who was unsuccessful in his teaching, but who was well trained from an "academic" standpoint? List characteristics of this teacher which would indicate that he had not received "professional" training.

14. Have you ever attempted to analyze your own learning procedures? How did you go about "learning" this chapter? Have you ever thought over the ways in which you arrived at a clear understanding of any problem? In the study of this text keep in mind and analyze from time to time your experiences as a learner in order that you may have this information to draw on when you try to assist your students in their learning. (This question will be referred to later in the course.)

15. The title of this book is *Directing Learning in the High School*. What is the significance of the phrase "directing learning"? Do you feel that your high-school teachers specifically tried to direct your learning? If so, in what ways? If not, give reasons for your opinion.

A LIBRARY FOR SUPPLEMENTARY READING

The following chapters represent a carefully organized discussion of the direction of learning in the high school from the point of view described in the preceding pages. Although it is profitable for advanced students in the field of education¹ to become acquainted with different points of view and with various discussions, the student beginning the study of a field is likely to be confused by studying different texts unless the references are carefully selected. For this reason it is suggested that the assignment of supplementary reading be restricted to references that elaborate the treatment of topics considered in the

¹In general these will be graduate students.

following chapters. The instructor should constantly bear in mind that half-learning represents inefficient instruction.

No bibliographies are given in the following chapters. Instead specific references to sources and supplementary discussions are given in footnotes. Most of these references are for the information of the instructor, but a number may be used as the basis of assignments to the class as a whole or to particular students for special reports. The following texts should be available for supplementary assignments:

- BAGLEY, W. C., and KEITH, J. A. H.—*An Introduction to Teaching*. New York: The Macmillan Company, 1924, 400 pp.
- CHARTERS, W. W.—*Methods of Teaching, Revised and Enlarged*. Chicago: Row, Peterson and Company, 1912, 444 pp.
- COLVIN, S. S.—*An Introduction to High-School Teaching*. New York: The Macmillan Company, 1917, 451 pp.
- DEWEY, JOHN.—*How We Think*. Boston: D. C. Heath and Company, 1910, 224 pp.
- DOUGLASS, H. R.—*Modern Methods in High-School Teaching*. Boston: Houghton Mifflin Company, 1926, 544 pp.
- LYMAN, R. L.—*The Mind at Work*. Chicago: Scott, Foresman and Company, 1924, 349 pp.
- PARKER, S. C.—*Methods of Teaching in High Schools, Revised Edition*, Boston: Ginn and Company, 1920, 529 pp.

CHAPTER II

LEARNING EXERCISES

[NOTE.—As pointed out in the Introduction, merely reading a textbook seldom results in a clear understanding of principles and topics discussed. The reader is therefore urged to work out a number of the exercises placed at the end of this and the other chapters in connection with reading the text. Occasionally the reader's attention will be called to exercises designed to lead to an understanding of a certain topic. It is suggested that the student read through the chapter or the section of it assigned in order to get its scope and general trend of thought in mind. Then he should attempt to work out a number of the exercises while reading it more carefully.]

The problem of this chapter.—Recognition of the principle of self-activity in learning, and acceptance of the thesis¹ that much of the learning activity in which high-school students engage will be in response to exercises assigned by the teacher raise questions such as the following:

1. What is a learning exercise?
2. What is the assigned exercise when the teacher explains or lectures?
3. How are learning exercises related to subject-matter and textbooks?
4. What criteria should be observed in devising and selecting learning exercises?

¹This thesis was referred to on page 5. It is not intended to imply that children learn only in response to learning exercises but merely that in the high school the teacher is primarily concerned with the stimulation and direction of

The general character of learning exercises.—Illustrations of a number of typical learning exercises will readily occur to the reader. In algebra the textbook provides equations to be solved, expressions to be factored, verbal problems to be solved, and other types of exercises; geometry texts contain a number of "original" exercises; in typewriting and music the student is asked to practice certain exercises; in English composition students are required to write themes. Some learning exercises are usually assigned for study outside of the recitation period; others are to be done in the classroom or laboratory. The term "learning exercise" is used to designate any type of exercise, any request to do, designed to form the basis of learning activity.

Questions are widely used as a means of measuring achievement but they also afford a basis for learning activity. Other typical learning exercises are requests to read certain pages in the text; to repeat a definition, declension, and the like; to translate a passage of a foreign language; to report on a special topic; to explain the solution of a problem; to engage in a debate on a given question; to collect specimens; to prepare an exhibit; to draw a diagram, map, or chart; to take notes on a lecture; to write a report of a laboratory exercise; to prepare a summary or an outline; to dramatize an historical event or the action of a story.

The reader should note that a learning exercise is a request to engage in some activity rather than a request to learn certain things. There is an important difference be-

learning based on assigned exercises. Learning on the play level is discussed by: FREEMAN, F. N.—*How Children Learn*. Boston: Houghton Mifflin Company, 1917, Chapter IV. BOBBITT, FRANKLIN.—*How to Make a Curriculum*. Boston: Houghton Mifflin Company, 1924, Chapter V.

tween telling students to learn the declension of a certain word and directing them to write out the declension and then repeat it orally until they are able to give any form asked for. In the first case the students are told what they are expected to learn but left to their own initiative in deciding what to do in endeavoring to attain the goal set for them; in the second case they are told what to do.

Learning exercises versus methods of stimulating and directing learning activities.—The reader should bear in mind that we are distinguishing between learning exercises, i.e., the tasks set for students to do, and the techniques which the teacher may employ in stimulating and guiding the students in their efforts to do exercises. Dividing a class into two competing teams, keeping a graphic record of achievement, offering prizes for the best work, and the like are particular techniques for motivating school work. Although motivation procedures are necessary, they do not furnish exercises for students to do.

Implied learning exercises.—When an explicit exercise is assigned, the nature of the request made of the student is apparent, but teachers frequently make assignments that only imply the nature of the activity in which the students are expected to engage. When a teacher assigns certain pages of the text to be studied the nature of the exercise is indicated in an indefinite way by the verb “study.” The words and phrases that make up the printed page are merely symbols which the author used in expressing certain ideas, meanings, concepts, facts, and principles. In “studying” a textbook the student is expected to engage in activities that will create corresponding ideas, meanings, etc., in his mind. However, a request to “take” certain pages of the text does not tell the student what he is to do in order to fulfill this expectation. A request to study cer-

tain pages of a text is essentially only a statement of what is to be learned. When the teacher states facts, rules, and principles, describes experiences, or expresses his thinking orally, there is an implied request that the students listen. There is a similar implied request when a member of a class recites.

Connections between learning exercises, learning activities, and abilities.—The three concepts, learning exercises, learning activities, and abilities, are connected. Learning exercises form the basis of the mental activity. In psychological language they furnish the stimulus, and the activity is the response. The abilities are the outcomes or products of the activity. This relationship furnishes a basis for predicting either the abilities that will result from the doing of certain learning exercises, or the learning exercises that should be assigned in order that students may acquire the abilities specified as objectives.¹

The character of the exercises a factor in determining the effectiveness of teaching.—The kind of exercises that a teacher assigns is an important factor in determining the effectiveness of his instruction. For example, suppose that a teacher of typewriting has set for his students the objective, "ability to copy ordinary prose at the rate of thirty-five words per minute with no more than three errors per hundred words." There are several learning exercises which he might assign as a means for starting his students to acquire this ability. A possible exercise would be to ask them to copy certain material using a "hunt and peck system." Another exercise would be to cover the keyboard

¹This statement is not intended to mean that the prediction will be highly accurate in all cases. The determination of what learning exercises to assign is an important and basic phase of the teacher's task, and every teacher is constantly making both types of predictions.

of the typewriter and have them type certain selected words and phrases, determining which keys to strike by looking at a chart on the wall. The success of a teacher of typewriting in engendering the degree of ability which he has set as the objective will depend upon the kind of learning exercises he assigns.

Suppose that a teacher of English literature has set as his objective the engendering of an interest in one of Shakespeare's plays. He then faces the problem of deciding what he will ask his students to do. A possible exercise would be to direct them to go through the book underlining all of the nouns. Another exercise would be to ask them to read the play for the purpose of determining which characters they like best. A third exercise would be to assign the various characters of the play to the different members of the class with the request that each prepare to read orally the lines of the part assigned. A fourth possible exercise would be to ask them to listen to the teacher as he reads the play or portions of it. The teacher's success in engendering an interest in the play will depend largely upon the character of the learning exercises which he assigns, both for study and for doing during the recitation period.

The type of learning exercises assigned is a potent factor in determining the kind of controls of conduct which the students will acquire. If specific habits are desired the exercise must call for drill, at least after the initial stages of learning. If "mastery" of knowledge is desired as the outcome, there must be exercises which require the use of knowledge; if ideals and interests are desired, the teacher must assign exercises that will stimulate an emotional response.

The statements of the above paragraph may impress

the reader as being platitudinous but they are frequently violated in practice. Students fail to achieve certain habits because they are not given sufficient practice; they cannot become fluent in solving algebraic equations or in speaking a foreign language without much practice. "Mastery" of knowledge is not achieved by listening to explanations or even by reading a textbook; there must be opportunity to apply facts and principles before "mastery" can be attained.

The problem of devising and selecting appropriate learning exercises.—The problem that the teacher faces in devising and selecting learning exercises may be stated in general terms as follows: Given certain goals¹ to be attained by the student, the teacher must determine (1) what learning activities will produce the abilities specified as objectives, and (2) what learning exercises will provide a satisfactory basis for these learning activities. Preliminary to the explicit consideration of this problem, it is necessary to inquire concerning the nature of abilities and learning activities, and the laws governing the functioning of learning activity.

The function of abilities.—The principle of self-activity in learning implies that whenever a student engages in activity, there is a product or outcome. This change in the student is called an "ability" and functions as "a control of conduct" on future occasions. Before a child has studied algebra his response to an algebraic symbol, such as x^2 , is not likely to be the correct one. If asked to read this symbol, he may say, "x with a small 2 above it." After he has studied algebra, i.e., engaged in certain learning activities, he is "changed." We describe the change by

¹Immediate objectives should be expressed in terms of abilities. This point is elaborated in Chapter III.

saying that he has acquired certain abilities, so that when asked to read this symbol he will say, "x square." One outcome of his participation in certain learning activities in the field of algebra is a "control of conduct" which enables him to respond correctly to a request to read the symbol x^2 .

If a student who has not studied physics is asked to solve a problem that requires the application of the law of falling bodies, he will probably be unable to give a satisfactory response. When he masters the law of falling bodies in his study of physics he is equipped so that he is able to apply it in the solving of problems. Learning the law of falling bodies means the acquiring of a control of conduct.

A person who has not studied music may be equipped with controls of conduct such that he is bored or even irritated by listening to the rendering of a highly technical musical selection. Such a person may acquire other controls of conduct by studying music appreciation with the result that his response to the rendering of a technical musical selection is characterized by satisfaction and pleasure rather than by dissatisfaction. The change that has taken place may be described as the acquiring of the ability to appreciate a certain type of music.

The illustrations just given suggest that abilities differ. Ability to read " x^2 " provides a type of control of conduct different in certain respects from that represented by "ability to apply the law of falling bodies" or by "ability to appreciate a highly technical musical selection." Certain characteristics of the situations for which responses are provided and the nature of the process of responding furnish a basis for a classification of abilities. However, the reader should bear in mind that psychologically all abilities have certain characteristics in common.

Types of outcomes considered as controls of conduct¹.—The types of controls of conduct described in the following paragraphs do not constitute a perfect set of captions for classifying the outcomes of learning activity. Frequently it will be difficult or impossible to distinguish between a specific habit and an item of knowledge. However, some analysis of the outcomes of learning activity is needed in order to understand the nature of the controls of conduct students are to acquire as the result of doing the exercises the teacher assigns.

I. *Specific habits: motor skills and fixed associations.*—Under this head we place all those outcomes of learning activity that function as automatic or largely mechanical controls of conduct. Memorized names, dates, events, and other facts belong to this class. In addition there are many habits that provide automatic motor responses. Examples of these are found in handwriting, the speaking of a foreign language, athletics, music, typewriting, etc. The significant characteristic of specific habits is that they provide ready-made responses to familiar situations.

II. *Knowledge or adaptive controls of conduct.*—Under the head of knowledge we group those controls of conduct (abilities) that function in overcoming difficulties presented by new situations. We commonly refer to them as ideas, concepts, meanings, facts, principles, and laws. The distinction between specific habits and knowledge is primarily on the basis of the type of situation for which a response is provided. If the situation is familiar and the person possesses a ready-made response, the control of conduct is called a specific habit. If the situation is new,

¹A more extended exposition of these rubrics of controls of conduct is given in Chapters V to X. The rubrics of abilities given here are similar to those given by BAGLEY, W. C.—*Educational Values*. New York: The Macmillan Company, 1911, Chapters II, III, IV, and V. BAGLEY, W. C., and KEITH, J. A. H.—*An Introduction to Teaching*. New York: The Macmillan Company, 1924, Chapter IX.

that is, if it presents a problem to be solved, and a response is manufactured by reflective thinking, knowledge is the name given to the controls of conduct that function. A supplementary concept of knowledge is furnished by the statement that "knowledge implies organization while information may mean mere scattered scraps of knowledge."

III. *General patterns of conduct.*—An ideal may be thought of as a general pattern to which conduct will conform in a variety of situations. Ideals have been described as "master ideas." In addition to the intellectual element, the idea, there is an emotional element, which adds power in controlling conduct. Neatness, honesty, patriotism, loyalty, altruism, and accuracy are names for certain common ideals.

Attitudes represent a number of less tangible but very important controls of conduct, which furnish general patterns of conduct or "mind sets." When we describe a person as being "conservative," we mean that his thinking is characterized by caution and also by reluctance to accept new ideas. The word "radical" is used to designate the opposite type of mind or attitude. Other words that designate certain attitudes are: scholarly, open-minded, prejudiced, independent, and judicial.

A similar kind of controls of conduct is commonly designated as "interests" or "tastes." An interest in or a preference for "jazz" causes one to seek that type of music and to avoid other kinds. An interest in outdoor sports directs one's leisure activities. What is called "good taste" controls one in furnishing his home or in buying his clothes.

Types of learning activity.—This analysis of outcomes suggests an analysis of learning activity. The mental processes that result in the acquisition of the several types of abilities differ in certain significant respects. The formation of specific habits is characterized by repetition or drill.

After a student has made a correct start, the learning of a habit can be described as attentive repetitions without exceptions until the desired degree of fluency is attained. In engendering specific habits a teacher can assign certain exercises to be done with considerable confidence that the student who does them will make progress in acquiring the objectives set for him.

Although repetition occurs in acquiring knowledge also, the learning process here is characterized by analysis, comparison, association, evaluation, and organization. Meaning is emphasized rather than fluency of response. The learning process is described as reflective thinking or problem solving rather than practice or drill. The process of acquiring ideals, attitudes, and other general patterns of conduct has not yet been described as definitely as has the learning process for specific habits and knowledge. It appears that one does not acquire an ideal, attitude, appreciation, taste, or interest by the doing of any definite learning exercise or series of learning exercises. A suggestion of the learning process is furnished by the statement that ideals, attitudes, appreciations, and the like are acquired as by-products in the learning of specific habits and knowledge. This implies that the engendering of these general patterns of conduct depends upon the methods of instruction, and incidental suggestions and comments by the teacher.

Psychologists have attempted to describe mental activity in terms of sensation, perception, conception, memory, imagination, association, analysis, generalization, and feeling.¹ Such rubrics of mental activity are helpful for certain purposes, but a somewhat different analysis of

¹For a typical discussion of these mental functions see: CAMERON, E. H.—*Psychology and the School*. New York: The Century Company, 1921, Chapters IV to X.

learning appears to provide a more practical basis for considering the technique of teaching. The "types of learning activity"¹ enumerated in the following paragraphs represent a pedagogical rather than a psychological analysis of the learning process.² The lines of demarcation are not precise, but the analysis should serve to enrich the reader's concept of learning activity.

I. *Direct or perceptual experiencing* occurs when a student prepares and serves a meal, plays as a member of an athletic team, builds a radio set, drives an automobile, engages in amateur photography, climbs a mountain, cares for a furnace, cultivates a garden, cares for a pet (dog, cat, etc.), visits an industrial plant, listens to a symphony, watches a football game, and the like. In direct experiencing there is always perception³ and hence the functioning of one or more of the sense organs. Sometimes such experiencing is called "concrete." A foundation of perceptual

¹The nearest approach to the types of learning activity given here is by BOBBITT, FRANKLIN.—*How to Make a Curriculum*. Boston: Houghton Mifflin Company, 1924, Chapter IV. His list includes (1) Observation, (2) Performance of function, (3) Reading, (4) Oral report, (5) Pictures, (6) Prolonging, repeating, and intensifying experiences, (7) Problem-solving, and (8) Generalization.

A shorter list is given by: PARKER, S. C.—*Methods of Teaching in High Schools, Revised Edition*. Boston: Ginn and Company, 1920, pp. 95-97, under the title of "Types of Learning" instead of "Types of Learning Activity."

For typical psychological discussions of the learning process, see: FREEMAN, F. N.—*How Children Learn*. Boston: Houghton Mifflin Company, 1917, Chapters VIII to XI. GATES, ARTHUR I.—*Psychology for Teachers*. New York: The Macmillan Company, 1925, Chapters XIII and XIV. MONROE, WALTER S. and DE VOSS, JAMES C.—*Educational Psychology* (to be published).

²The descriptions given here are brief since a more extended discussion seemed desirable in connection with the consideration of the direction of the several types of activity. See Chapters VI, VII, and VIII.

³For a discussion of perception see: CAMERON, E. H.—*Psychology and the School*. New York: The Century Company, 1921, Chapter V. MONROE, WALTER S., and DEVOSS, JAMES C.—*Educational Psychology*, Garden City, N. Y., Doubleday, Page and Company (to be published).

experience is required for the other rubrics of learning activity but the typical high-school student possesses a rich store of experience as the result of his training in the elementary school and his activities in the home and community. The provisions for laboratories and shops and the assignment of field trips and visits to industrial plants are evidence of the recognition of the high school's responsibility for providing for additional direct experiencing. A type of experiencing is secured by dramatizing adult activities, that is, by reproducing in the school such activities as cooking and serving meals, banking, constructing a house or other building in the shop, legislative activities of Congress or other governmental units, and the like. Although the reproduced activity is usually artificial in the sense that it is governed by school conditions rather than by social needs, a student who engages in it is afforded an opportunity to see, hear, do, etc., that may be useful in providing basic perceptual experiences.

II. *Vicarious experiencing* occurs when a student reads a well-written account of a football game or other direct experience, or listens to an oral description. In such cases the student re-experiences what another has experienced. The spectator at a football game experiences directly the seeing of the plays and the hearing of the cheering but he may also experience second hand or vicariously the playing of the game.

III. *Generalizing experience* is used as a name for a type of learning activity in which one analyzes, compares, organizes, abstracts, and classifies his experiences, both direct and vicarious. The process of generalizing is sometimes called "inductive development" and the products of the activity are referred to as concepts, principles, rules, generalizations, and abstractions.

IV. *Comprehending the products of thought* designates a type of mental activity which in some respects is the reverse of generalizing experience. In the course of the history of the race, concepts, definitions, principles, rules, and other generalizations have been evolved, and in order to profit by this social heritage, the student must comprehend these products of thinking, which are usually stated in verbal form. Parker¹ calls this type of learning activity "acquiring general and abstract meanings."

V. *Using one's knowledge in manufacturing a response to a new situation*² is commonly called "problem solving" or reflective thinking. These terms, however, are used somewhat carelessly and for this reason a descriptive phrase has been introduced which explicitly specifies the activity of responding to a *new* situation. The terms "problem" and "thought question" are generally used as names for the exercises that lead to this type of learning activity, but if a "problem" or "thought question" is not new the student may respond by remembering the response he gave on a previous occasion. He may learn as the result of such activity but the activity is not included under this rubric. (See page 37.) Many "problems" in algebra provide practice in manipulating algebraic symbols but do not furnish a basis for reflective thinking. The study of a demonstration of a theorem in geometry is not a case of using knowledge in meeting a new situation. Thought questions in history, science, and other subjects are perhaps the most frequent of all exercises requiring the use of knowledge or independent thinking. Whenever a student encounters a

¹PARKER, S. C.—*Methods of Teaching in High Schools, Revised Edition*. Boston: Ginn and Company, 1920, p. 205 f.

²A "new situation" involves some familiar elements, but the total situation is one that the person has not encountered before.

difficulty or is asked a question for which he is unable to recall a ready-made answer he has a problem to solve. If he manufactures a solution for himself rather than secures it ready-made from the instructor or textbook he engages in independent thinking. Translating a foreign language, particularly by one who is unable to do it fluently, probably comes under this type of learning activity.

VI. *Tracing the thinking of another person* by listening to an oral description of it or by reading a printed record constitutes a sixth type of learning activity. It occurs when a pupil listens to an explanation of the solution of a problem given by the teacher or by another pupil. This type of learning activity differs from "using one's knowledge in manufacturing a response to a new situation" in that when the student "traces the thinking of another person" he is a follower, whereas in solving a problem he is relying upon his own initiative and resourcefulness.

VII. *Expressing one's ideas*¹ is educative, particularly when attention is given to the evaluation and organization of them. A student learns by explaining the solution of a problem, but the amount of learning may become almost negligible if he merely follows a definite formula as was the case in some of the teaching of mental arithmetic.

VIII. "*Prolonging, repeating, and intensifying one's experiences*"² represents a type of learning activity which is very prominent in school work. "Practice" and "drill" are commonly used as names for this activity, but the meaning associated with these terms represents a some-

¹Parker has emphasized expression as a learning activity. See PARKER, S. C.—*Methods of Teaching in High Schools, Revised Edition*. Boston: Ginn and Company, 1920, Chapter XI.

²This phrase is suggested by: BOBBITT, FRANKLIN.—*How to Make a Curriculum*. Boston: Houghton Mifflin Company, 1924, p. 57. The term "experiences" in this phrase has a somewhat broader meaning than on page 33.

what more limited concept than is intended here. Students "live over" perceptual experiences; they recall what they have read or heard; they rethink through the solution of a problem; they retrace the thinking of another; they re-associate a meaning with an abstract or general term. If such repetitions occur sufficiently often, the product may be described as a specific habit (memorized or fixed association) but when the repetitions are few in number, "intensified experience" is a more accurate designation of the outcome. Usually it is necessary to supplement the learning that occurs in observing, reading, and listening. The ideas, meanings, and concepts which result from these activities need to be strengthened, evaluated, and organized. Summarizing and outlining represent two types of exercises under this head. Taking notes on a reading assignment or a lecture is another.

IX. *Feeling or emotional activity* does not occur independently but rather as a concomitant of the preceding types which may be described as intellectual. It does, however, represent an important phase of learning. It is prominent in the reading of literature (especially poetry), listening to music, looking at pictures, listening to an inspirational address, participating in group singing, and the like. In some of these activities the intellectual element may be overshadowed by the feeling or emotion.

Laws governing the functioning of learning activity.—The statement that participation in learning activity produces some type of change in the student is only a general principle. The effectiveness of any learning activity in producing changes (specific habits, knowledge, or general patterns of conduct) is dependent upon several factors. The most important is probably the degree of satisfaction that accompanies the activity. The other factors include

the frequency and distribution of the activity, the mind set of the learner and his intelligence or capacity to learn. Certain statements may be made relative to the influence of these factors upon the outcomes of learning activities.¹

I. If other factors affecting learning remain unchanged, the strength of a modifiable connection between a situation and a response² is strengthened as it is exercised and up to a certain limit the strength of the connection increases with the amount of exercise but not in a constant ratio.

II. Other conditions being equal, the more recent the exercise of a modifiable connection between a situation and a response, the stronger the connection is. This implies that a connection which is not exercised gradually grows weaker.

III. The effect of the exercise of a modifiable connection between a situation and a response depends upon the degree of satisfaction that accompanies or follows the activity. Other conditions being equal, when "a satisfying state of affairs" prevails, the connection is strengthened; when a state of dissatisfaction or annoyance prevails, the connection is weakened.

IV. The strengthening effect of the exercise of a modifiable connection between a situation and a response de-

¹The "laws of learning" given here are based on formulations by Thorndike. It is assumed that the reader has studied this topic in a previous course on educational psychology. Hence the mention here is confined to a formal statement of the laws of learning. For a discussion of them see THORNDIKE, E. L.—*Educational Psychology, Briefer Course*. New York: Teachers College, Columbia University, 1914, Chapters X and XI. GATES, ARTHUR I.—*Psychology for Students of Education*. New York: The Macmillan Company, 1923. Chapter X.

²Any acquired control of conduct is considered here as consisting of "a modifiable connection between a situation and a response." The situation may be a fact question, problem, picture, rendition of a musical selection, printed passage, or any other stimulus to which one responds. "Exercise of a modifiable connection between a situation and a response" may be interpreted as an elaboration of the phrase, "learning activity."

pend upon the distribution of the exercise, and other things being equal the maximum effect is obtained by distributing rather than concentrating it.

V. The subject's capacity to learn (commonly called general intelligence) contributes to the effect of the exercise of a modifiable connection between a situation and a response.¹

The textbook a practical factor in devising and selecting learning exercises.—Certain phases of the content of a textbook tend to limit the learning exercises which a teacher may devise with reference to it. A description of a perceptual experience is to be used as a basis for an exercise that results in vicarious experiencing; records of thinking are to be traced; poetry is to be read for enjoyment; recorded products of thought are to be comprehended.

Many educators assert that the content of our textbooks is very unsatisfactory and that we cannot increase greatly the efficiency of instruction in our high schools until we effect a radical revision of the subject-matter presented in textbooks. They point out that our present textbooks, which determine largely the objectives of the courses of instruction, have been written by specialists who were guided by their particular interests rather than by appropriate educational objectives. We should, however, not be too severe in our criticism of the writers of our textbooks. In the first place, it is necessary that they be written by specialists because an intimate knowledge of the subject-

¹This law of learning is not explicitly stated by Thorndike or Gates. Evidence of the precise nature of the effect of general intelligence upon learning is fragmentary but the consensus of opinion is commonly expressed by saying that "bright" students learn more rapidly while those on the lower levels of intelligence learn more slowly. "Bright" students are also able to engage in more difficult types of learning activity.

matter field is a necessary prerequisite for the writing of a satisfactory text. In the second place, we have not yet identified and agreed upon the details of the educational objectives¹ that should be attained by the several divisions of our public schools. When the status of the science of education is considered, our texts are about as good as we should expect. Since 1900 many significant improvements have been effected, and the present interest in curriculum construction indicates that we may look forward to even greater progress in providing satisfactory textbooks.

The organization of a textbook is also a limiting factor in devising learning exercises. One plan of organization is represented by the dictionary or encyclopedia, in which each item of subject-matter is presented as a separate unit. Related items are not connected either by position or by direct association. The alphabetical order of presentation is arbitrary. The effect of such a plan or organization is to minimize the relations which exist among the several items of subject-matter. If a student should limit his learning to a study of the pages of a dictionary in regular order his knowledge would not be well organized and as a result it would lose much of its usefulness.

The term "psychological" has been used to describe a type of organization in which the several items of subject-matter are presented in the order that a learner is likely to feel a need for them. The best illustrations of this type of organization are found in advanced problem courses where no textbook is used and the class focuses its attention upon the study of certain large problems or topics. The order in which the various phases are taken up is determined by the needs that arise in their study of it. When the organization of a textbook is psychological, the teach-

¹For a discussion of this point see page 53.

er's task of devising learning exercises is simplified because the subject is grouped about certain problems which may be assigned as exercises. However, it will usually be necessary for the teacher to devise exercises that will cause his students to organize logically what they learn from the study of the text.

The organization of most textbooks is logical rather than psychological.¹ In such an organization the order of the several items of subject-matter is determined by their logical sequence and interdependence rather than by the probable need of students for them. An illustration of a logical organization is found in most geometry textbooks. Here the order of the several theorems is determined by the logic of their sequence. When the organization is logical the application of the experiences, facts, concepts, etc., is likely not to be apparent and consequently the teacher finds it more difficult to devise learning exercises that create a need for the study of the text.² Furthermore, the teacher will need to devise opportunities for the students to apply what they learn from the study of a logically organized text. Otherwise their "knowledge" is likely to remain abstract.

The teacher's responsibility for devising and selecting exercises.—The teacher is responsible for the exercises the students are asked to do during the recitation period as well as those that are assigned for "study." Some of the recitation exercises may be designed to fulfill a testing function, but most of them should be formulated with reference to their educative value.

¹Frequently a psychological organization is described as being opposed to a logical one; such a distinction is not justified because a psychological organization may also be logical, but it is not necessarily so.

²This point is considered more fully in Chapter IV, page 99.

Although the teacher is responsible for devising and selecting learning exercises, he may appropriately encourage students to propose things which they would like to do. In such subjects as shop work, physics, and chemistry, students frequently approach the teacher with the request to be allowed to undertake certain projects. The teacher should welcome these suggestions, and if the proposal has merit as a learning exercise he should grant the request if it is possible to do so. Students frequently ask good questions in history, literature, science, and other subjects, and should be encouraged to do this. Other things being equal a question asked by a student is a better learning exercise than one proposed by the teacher.

The project method¹ is the name given to a form of instruction under which the learning activities of students represent their efforts to realize their own purposes. It may appear that when this method is followed the teacher is relieved of his responsibility for devising learning exercises. However, this relief is more apparent than real; the teacher is merely directing his efforts to a slightly different end. Furthermore, as we observed in Chapter I, it does not appear that the project method should become the exclusive or even typical instructional procedure in the high school.

Many textbook writers attempt to furnish the teacher with a number of learning exercises² and as we have indicated other exercises are frequently suggested by the organization of the text. However, it is not possible for the author of a text to supply all of the learning exercises needed and in many instances he does not attempt to do more than provide a few illustrative or suggestive exercises.

¹See page 5 and Chapter XIV.

²The best illustrations are texts in mathematics and laboratory manuals.

Even in mathematics, analysis of texts has revealed many "gaps" in the needed exercises. The teacher must accept the responsibility for discovering any existing gaps in the exercises provided by the author of a text and devise whatever additional ones may be needed. When the text furnishes few learning exercises, the teacher's responsibility is greater.

Selection and organization of subject-matter by the teacher.—Although the teacher should not be indifferent to the content of the subject he is teaching, its determination and organization do not constitute one of his major problems. When a textbook has been adopted for use the teacher should exercise caution in making modifications of it. Immature students, such as we have in our high schools, easily become confused unless the course is well organized. Furthermore, they are accustomed to rely upon the textbook; and if marked departures are made from it, either in content or organization, their study is likely to be made more difficult. A well-made textbook represents a carefully planned content and organization, and unintelligent meddling with either feature is apt to lessen its usefulness as an instrument of instruction.

The teacher should maintain an active interest in the improvement of the content of the subjects in which he gives instruction and should endeavor to become informed in regard to significant curriculum studies in his field. However, he should be cautious in applying the results of such investigations to his work. It is usually safe to supplement a textbook but such a practice when carried to an extreme tends to handicap students in their learning.

It is not out of place to suggest that possibly some educators are placing more emphasis upon the determination of the content of the subject than is justified. One of

our educational objectives is to train students to become skilful learners.¹ The realization of this objective does not seem to be influenced greatly by the "poor" nature of the content of the subjects which the student pursues. When we consider the engendering of ideals and attitudes, the exact character of the content does not appear to be as potent a factor as the type of learning exercises set for the student and the character of the guidance and assistance given by the teacher.

Adapting subject-matter to the needs of the community.—Some writers have emphasized the desirability of adapting the subject-matter of the courses taught in high school to the particular needs of the community in which the school is located. They point out that communities vary in adult activities and hence the preparation for participation in these activities should vary correspondingly. A textbook written for general use is not likely to be adapted specifically to the needs of a particular community, especially if it has highly specialized vocational activities. Hence they urge that the school should modify the content of certain courses in order to give more specific preparation for the particular adult activities of the community.

This point of view is in general commendable, but it is possible to make serious mistakes in attempting to adapt the content of high-school subjects to the needs of local communities. In the first place, it is not easy to determine what the needs of a given community are. Vocational needs are most conspicuous but are not the only ones. The child will become not only a citizen of a local community but also a citizen of the state and nation. Furthermore, he probably will not continue to live in the community in which

¹See page 73.

he receives his education. The school must recognize its obligation to equip a child for participating in the activities of the state and the nation, as well as in those of a given community, and in addition it should equip him so that he can adjust himself to another local community when he changes his residence.

Adaptation of learning exercises to individual differences.¹—As we pointed out in Chapter I, the students whom a teacher instructs as a class are usually characterized by many differences in the traits that affect their learning. Adaptation of school work to these differences begins with the assignment of learning exercises. A task that is beyond the capacity of a student will not be effective in educating him; success for him should always be possible. On the other hand, a task may be so easy that it has no educative value. Some students work more rapidly than others and hence can do a greater number of learning exercises within a given period. In adapting school work to the individual differences of their students, some teachers assign certain optional learning exercises which they expect to be done only by the more capable students. Some authorities recommend that in conducting a recitation the teacher distribute the questions asked so that the easier ones will be given to the less capable students and the more difficult ones to the brighter students.²

General criteria to be observed in devising learning exercises.—In Chapters V to X the problem of devising and

¹A type of adaptation of learning exercises to individual differences may be secured through the organization of the high school. In some schools classes are divided into sections on the basis of capacity. A consideration of such procedures is beyond the scope of this book. See: MONROE, WALTER S., and WEBER, OSCAR F.—*The High School*. Garden City, N. Y.: Doubleday, Page and Company (to be published).

²Adapting instructional procedures to individual differences is considered more fully in Chapter XII.

selecting learning exercises is considered in detail for each of the three rubrics of controls of conduct, but certain general criteria may be stated here.

I. An exercise is an explicit request to do something. A direct request to acquire a given control of conduct, such as a rule or principle, is a statement of an objective to be attained. A command to "study" a law in physics, a rule in grammar, or an account of an historical event provides a basis for activity only by implication. It is usually interpreted to mean "Memorize certain pages of the text well enough so that you can answer in the words of the author or in your own words the questions which will be asked in class to-morrow."

II. The learning exercises should be compatible with the teacher's immediate objectives, that is, they should provide a basis for those activities whose outcomes will be the abilities specified as immediate objectives.

III. Except when repetition is the principal activity desired, the exercises should be sufficiently difficult to constitute a real challenge to the students. In other words, the student should find it necessary to "stretch" himself in doing them. (This rule is especially important when the learning exercise is a thought question or other types of situations requiring the use of knowledge.)

IV. On the other hand, a learning exercise should not be unnecessarily difficult. It should be suitable for the educational status of the students as well as for their level of capacity to learn. Practical difficulties such as non-availability of reference books should be eliminated.

V. In view of the fact that the members of a class exhibit differences in capacity to learn, the preceding rules imply that learning exercises should be adapted to individual differences.

VI. In general an exercise or a closely related group of exercises should provide the basis for a relatively large unit of learning activity. Frequently this unit of activity may extend over several days and in some cases several weeks. Isolated learning exercises should be avoided.

VII. It is important that the learning exercise and the conditions attending the doing of it be such that the activity will be accompanied by a feeling of satisfaction.

VIII. The learning exercise should be stated so that the students will be able to understand what is to be done. Sometimes it is desirable to include a statement of the immediate objectives to be attained.

IX. The exercises assigned for home study together with those to be done in the laboratory or responded to during the recitation should constitute a "balanced ration."

X. The basis for judging the effectiveness of a learning exercise should be the controls of conduct which students acquire from doing it rather than the interest which they manifest in it, or the observable products of their activity. High-school students like to do many things which have little educative value. Their interest in athletics, parties, excursions, and other extra-curricular activities is evidence of this fact. Hence, interest alone cannot be taken as a measure of the value of a given learning exercise.

The quality of observable school products¹ depends upon the detailed character of the directions and guidance which the students have received. Frequently a teacher may do important phases of the work. For example, if a student in the manual training shop is provided with detailed drawings and directions for making a table and if

¹These include things made in the shop, laboratory, exhibits in Latin, history, and other subjects, as well as written work of all kinds.

the teacher frequently helps him, he probably will produce a well-designed and well-made piece of furniture; but he may have learned much less than another student, who makes a table that is relatively crude both in design and workmanship, but who has received a minimum of direction and assistance from the teacher. Other illustrations might be given to show that the observable product is not always a true index of the effect of a given learning exercise upon the student. Hence, in evaluating learning exercises the teacher should look beyond the observable product and the evidence of interest and attempt to appraise the controls of conduct that have been engendered in his students.

LEARNING EXERCISES FOR THE READER

1. Students of comparative education have stated that, in the United States more than in any other country, the textbook is used throughout the school system; and they have added the criticism that it is followed too slavishly by the average teacher. Each of you doubtless can recall a teacher who seemed a slave to the text. If so, describe the course and its effect upon the class.

2. After considering question 1, describe the work of one of your teachers who considered the textbook an important instrument of instruction but who did not rely solely upon its use.

3. Have you ever taken a course of any kind in which no textbook was used? If so, describe the course and give your opinion as to its value.

4. Think of a poem or of a selection from literature which you studied in school and which you like very much. What kinds of learning exercises did your teacher ask you to do?

5. Two eighth-grade teachers were presenting "Thanatopsis" to their classes. The first stated that the poem was famous but very difficult and directed her students while reading it to look up the meaning of each unfamiliar word and to think over each

passage until they could understand it. A girl from this class stated several years later when she was in high school that she "hated" the poem, "saw no sense in it", and would never read it again. The second teacher talked to her class of the beauty of the poem, told how it had been written by a boy of eighteen, and so forth, read the poem aloud, dwelling on certain passages, and then told the students to read it for themselves, to learn to love it, although perhaps they might not at the time understand it all. A girl from this class read the poem over and over until she memorized it and said later after she had graduated from a university that she had repeated the poem hundreds of times, appreciating it more and more, and that she had never forgotten a line of it. The two girls were members of the same family. What is your opinion of the two teachers? Give your reasons.

6. "A learning exercise is a basis for activity, physical, mental, or emotional, on the part of the student." Discuss the meaning of the quoted statement and give examples of learning exercises that provoke physical activities, mental activities, and emotional activities.

7. "In evaluating learning exercises, the teacher should look beyond the observable product and the evidence of interest, and should attempt to appraise the controls of conduct that have been engendered in his students." Give illustrations, imaginary if you wish, of a teacher who did and of one who did not evaluate learning exercises according to the statement given above.

8. Define and illustrate the following terms: subject-matter, emotional response, vicarious experience, ready-made answer, psychological organization, logical organization, criterion.

9. In this chapter ten criteria regarding the devising of learning exercises have been stated. Select from your recent assignments the learning exercises that you consider best and evaluate them according to each criterion. Select some of the worst also and evaluate them.

10. For some high-school subject compile a list of as many kinds of learning exercises as you can find in textbooks or can think of. Remember that a learning exercise is a request to do something.

11. Examine each of the kinds of learning exercises in the list you formulated in answering the preceding exercise and try to

determine (1) the kind of mental activity a student would engage in in doing the exercises, and (2) the nature of the outcome.

12. Devise three exercises that you think would lead to a mastery of the concepts and principles of this chapter. Point out the particular merits of your exercises.

CHAPTER III

TEACHERS' OBJECTIVES

Questions to be considered in this chapter.—Since the exercises assigned by the teacher serve as the basis of most of the learning activity in which students engage, and consequently also as the basis of most of what they learn, the function of the high school will be fulfilled only if teachers devise and select learning exercises compatible with the recognized educational objectives. This general statement suggests several questions:

1. What are the objectives of the high school?
2. In what form should a teacher formulate the objectives to be attained in a particular subject?
3. How can the compatibility of learning exercises and objectives be determined?

Typical statements of educational objectives.—The general aim of education has been expressed in many ways. A very common statement is: ("The purpose of education is to prepare for complete living.") Recently, educational writers have tended to elaborate the concept epitomized in this sentence in order to express more clearly the goals toward which students should be guided. The statement formulated by the Commission on the Reorganization of Secondary Education and usually designated as the "Cardinal Principles of Secondary Education"¹ is repre-

¹"Report on cardinal principles of secondary education." Commission on the Reorganization of Secondary Education. United States Bureau of Education Bulletin, 1918, No. 35. Washington, 1918, 32 pp.

sentative of our present thinking about the purposes of secondary education. This formulation is epitomized in the statement that the main objectives of education are:

1. Health
2. Command of fundamental processes
3. Worthy home membership
4. Vocation
5. Citizenship
6. Worthy use of leisure
7. Ethical character.

A committee of the North Central Association of Colleges and Secondary Schools has given us a slightly different statement of objectives:

"The ultimate aims stated in terms of disposition and ability may be summarized as follows:

- 1 To maintain health and physical fitness.
2. To use leisure time in right ways.
3. To engage successfully in vocational activities.
4. To sustain successfully certain definite relationships such as domestic, community, civic, and the like."¹

Difficulties in applying such formulations of educational objectives to instructional problems.—Certain difficulties become apparent when one attempts to apply such formulations of educational objectives in devising and selecting learning exercises. Phrases such as "ethical character," "health," "right habits of conduct," "appreciations," "life activities," and "citizenship" do not express concepts that the high-school teacher is able to apply directly in deciding what learning exercises he should ask his students to do. In so far as such "high-sounding terms" have mean-

¹"Report on standards for reorganization of secondary school curricula, 1924." North Central Association of Colleges and Secondary Schools. March 20, 21, 22, 1924, p. 6.

ing, they describe the conduct of "educated" persons rather than the particular abilities or controls of conduct they possess. Hence "character," "culture," "social efficiency," "a well-disciplined mind," and the like refer to ultimate and general educational objectives rather than the immediate goals to be attained by students in first-year algebra, civics, Latin, home economics, English literature, etc.

The determination of immediate objectives.—An approach to the determination of the immediate objectives is furnished by the principle that a teacher's immediate purpose is to cause his students to acquire certain abilities. Thus "determining immediate objectives" means "determining the abilities students are to acquire." A number of workers in the field of curriculum construction have made a beginning in the identification of the particular abilities that our schools are expected to engender. For example, Bobbitt in his recent volume, *How to Make a Curriculum*,¹ lists a large number of abilities as objectives for the various high-school subjects. Other students of the curriculum, accepting the thesis that the general aim of education is to prepare children for efficient participation in the activities of adult life, have attempted to analyze the duties that adults now perform for the purpose of ascertaining what abilities are necessary for satisfactory participation. Thousands of pages of the writings of adults have been analyzed in order to determine what words children should be asked to learn to spell during their study of this subject in the elementary school. Masses of data have been collected and analyzed for the purpose of determining the types of arithmetical problems which adults find it necessary to solve. Thousands of pages of periodicals have been

¹Published by Houghton Mifflin Company, 1924.

read for the purpose of determining the frequency of occurrence of allusions to geographical and historical facts. Elaborate investigations have been conducted in other fields for the purpose of determining the abilities that children should be asked to acquire in school.

Such curriculum studies are helpful but they provide only limited assistance to the teacher who is endeavoring to arrive at a clear understanding of the objectives to be attained by his students. They do not reveal the nature of the abilities to be acquired by them. For example, the determination of the words which adults use most frequently in written expression does not yield complete specifications of the abilities that students should acquire in the field of spelling. One way to spell words correctly is to consult the dictionary and copy the letters in the order given there. In this case "ability to spell" would mean "ability to find a word in the dictionary plus ability to copy the letters in the proper order."¹ Of course such a definition of spelling ability is absurd for commonly used words, but it is possible to define various degrees of fluency in the spelling of words used in written expression. Hence a list of the most commonly used words only partially specifies the abilities to be acquired by the study of spelling. The determination of the frequency of allusions to historical facts in periodical literature cannot reveal the precise nature of the historical abilities required for efficient reading of such material. "Knowing" a date, event, or other historical facts is not defined.

A hierarchy of educational objectives.—The basic difficulty in applying many formulations of educational objectives is due to the fact that the aim of education may be

¹There should probably be added a third element, the disposition to use the dictionary.

considered from several points of view, which tend to form a sequence. The immediate objective of the teacher is to stimulate and direct his students so that they will acquire certain abilities, such as ability to solve quadratic equations of a specified type; ability to type from copy a specified number of words per minute; ability to translate certain passages of a foreign language; ability to apply principles of physics in solving certain types of problems; ability to plan and construct a table or chair in the shop; ability to organize information relating to a topic and present it effectively; and the like. Sometimes the teacher shifts his objective from abilities to be acquired to the learning activities he asks his students to engage in. In such cases his efforts are focused on getting his students to do certain problems or laboratory exercises, to write themes or book reviews, and the like. This type of immediate objective has been described as "ground to be covered" and frequently is thought of in terms of the pages of a textbook to be read, or a list of topics (usually expressed as an outline) to be studied.

Abilities are engendered by the school in order that the students may be equipped with controls of conduct for performing the duties of adult life. Hence the desired kinds of future behavior or conduct may be considered as the *ultimate* objectives of education. These have been defined in two ways: *first*, by describing the general character or quality of the desired future conduct using such terms as character, social efficiency, culture, a well-disciplined mind, and the like; and *second*, by specifying the duties to be performed in adult life. (An illustration of a general statement of ultimate objectives from the second point of view is furnished by the following enumeration given by Bobbitt of the classes of activities in which adults engage:

1. Language activities; social intercommunication.
2. Health activities.
3. Citizenship activities.
4. General social activities—meeting and mingling with others.
5. Spare-time activities, amusements, recreations.
6. Keeping one's self mentally fit—analogous to the health activities of keeping one's self physically fit.
7. Religious activities.
8. Parental activities, the upbringing of children, the maintenance of a proper home life.
9. Unspecialized or non-vocational practical activities.
10. The labors of one's calling.¹

The four classes or orders of objectives described in the preceding discussion may be summarized as follows:

1. *Learning activities to be engaged in by students.*—This type of objective is usually described in terms of learning exercises to be done or “ground-to-be covered.”
2. *Abilities to be engendered.*—When objectives are thought of in terms of “abilities to be engendered” the doing of exercises becomes a means to this end.
3. *Future behavior described in general terms.*²—Such terms as citizenship, character, social efficiency, culture, democracy, and so forth are used in stating objectives of this order.
4. *Duties of adult life, or occasions for the use of abilities.*—The relation between duties and “future behavior” may be described by saying that the terms, such as character, citizenship, social efficiency, and

¹BOBBITT, FRANKLIN.—*How to Make a Curriculum*. Boston: Houghton Mifflin Company, 1924, pp. 8-9.

²Objectives of this order may describe the behavior of an individual or of groups of persons.

so forth, used in describing future behavior specify in a general way how the duties of adult life are to be performed.¹

This hierarchy of objectives provides a basis for classifying statements of aim and hence a means for indicating their merits for the high-school teacher. The "Cardinal Principles of Secondary Education" clearly come under the third order of objectives. Bobbitt's list of activities belongs under the fourth. The teacher's attention should be focused upon the "abilities to be engendered" and he should always consider learning activity (the doing of assigned exercises) as a means to that end. The teacher, however, should not forget that the ultimate purpose of the school is to contribute to equipping students for socially efficient performance of the duties of adult life.

The determination of ultimate objectives.—The requirements for "socially efficient performance" must be derived from the nature of the social group which we desire the adults of the future to form.) It is not the author's purpose to enter into a consideration of the character of this social group.² To do so would lead us too far astray from the intended scope of the book. (However, teachers should realize that the source of our ultimate educational objec-

¹The techniques employed in determining the duties of adult life have been called "job analysis" or "activity analysis." The purpose of such analyses is to determine the duties that adults perform. After this has been done it remains to determine the relative importance of the duties revealed and also the kind of behavior that is desirable in connection with each duty. For an account of the technique of job analysis, see: CHARTERS, W. W.—*Curriculum Construction*. New York: The Macmillan Company, 1923, Chapters IV, V, and VI.

²The reader who wishes to pursue this topic should consult such texts as the following: MONROE, WALTER S., and WEBER, OSCAR F.—*The High School*. Garden City, N. Y.: Doubleday, Page and Company (to be published). BOBBITT, FRANKLIN.—*How to Make a Curriculum*. Boston: Houghton Mifflin Company, 1924, 292 pp. CHARTERS, W. W.—*Curriculum Construction*. New York: The Macmillan Company, 1924, 352 pp.

tives must be the nature of the social group we desire to build up and perpetuate. History furnishes illustrations of the relation between the kind of social group desired and the ultimate educational objectives adopted by a nation. Different national groups have exhibited distinctive educational objectives. For example, those of the Germans before 1914 were derived directly from the type of nation they wished to build up and perpetuate. If one accepts the kind of social group which they considered desirable, he will be forced to accept also their ultimate educational objectives.

It is the function of treatises on special methods to enumerate in some detail the abilities to be engendered in the different school subjects.¹ For this reason the discussion of this chapter will not be extended beyond indicating the type of objectives teachers should endeavor to formulate and the terms in which they should be expressed. Before treating this topic further, it will be helpful to note certain general phases of the function of secondary schools.

The responsibility of the high school for the education of the child.—The child does not receive all of his education through the school. He acquires many controls of conduct from his home life, contacts with his playmates, travel, association with adults other than his immediate family, reading newspapers and other periodicals, and other influences. These educative factors do not contribute equally to all children or in all communities. In some cases the contribution from a certain influence may be negligible. In other cases the contribution may be destructive in the

¹A somewhat elaborate general treatment of objectives in terms of abilities to be engendered has been published by BOBBITT, FRANKLIN.—*How to Make a Curriculum*. Boston: Houghton Mifflin Company, 1924, 292 pp. Although the abilities are described in general terms, the examination of these lists will serve to give the reader an understanding of the immediate objectives in the several high-school subjects.

sense that undesirable controls of conduct are engendered.

The history of education shows that society has created schools and assigned to them the responsibility of supplementing other educative influences so that the children will be equipped for socially efficient participation in the activities of adult life.¹ Thus in formulating the objectives of secondary education, it is necessary that we recognize the other educative influences to which children are subjected. The immediate objectives of the high school should be such that the education which the child has received in the elementary school and from non-school sources will be appropriately supplemented.

Acceptance of this principle implies that the immediate objectives of a high school will depend somewhat upon the community in which the high school is situated. If the children of the community are subjected to many wholesome influences both in the home and in the community itself, the high school's responsibility will be relatively less than in another community where many of these influences are absent. Those responsible for the formulation of the detailed objectives of the high school should see to it that there are no "gaps" in the child's equipment for future life and also that there is a minimum of duplication in his training.

The changing concept of the objectives of secondary education.²—As general social conditions have changed in our country there have been corresponding changes in our

¹This statement is not intended to mean that the child is expected to acquire complete equipment during the period of his formal education, but rather that he should acquire sufficient equipment so that his participation in the activities of adult life will be *socially* efficient.

²For a comprehensive discussion of this topic see: MONROE, WALTER S., and WEBER, OSCAR F.—*The High School*. Garden City, N. Y.: Doubleday, Page and Company (to be published).

educational objectives, particularly those pertaining to the secondary school. (At one time the chief objective of the secondary school was the preparation of its students for college entrance. Since 1890 there has been a phenomenal increase in the number of students attending high school. As the number of students enrolled has increased, the high school has modified its objectives because it has been obvious that many of the students would not continue their education beyond the twelfth grade.) During recent years preparation for certain vocations has been recognized by many high schools as an important objective.

The effect of social and economic changes upon high-school objectives in the past suggests that we may expect still other modifications in the future. Hence, a prospective high-school teacher should not assume that the concept of objectives which were reflected in the high school he attended will be adequate for him as a teacher. Furthermore, no teacher should expect that any formulation of objectives which he has made or may make, will not need restatement and, possibly, modification from time to time. Each formulation, however, should be an improvement over the preceding one.

A classification of immediate objectives.—Since the immediate objectives are abilities to be acquired, the three types of outcomes of learning activity described in Chapter II furnish a basis for classifying them.¹ When an objective is labeled as a specific habit, an item of knowledge, or a general pattern of conduct, it is thereby given added meaning. Consequently it is suggested that teachers classify their immediate objectives as:²

¹The terminology to be used in stating immediate objectives is considered later. See page 66.

²A more elaborate plan of classification could be formulated but its usefulness appears doubtful.

- I. Fixed controls of conduct (specific habits).
- II. Adaptive controls of conduct (knowledge).
- III. General patterns of conduct (generalized controls).

Relative importance of the rubrics of abilities.—Although it is not possible to give a definite answer to the question implied in the paragraph heading, certain considerations may be noted. The elementary school is responsible for engendering a large number of specific habits in reading (both oral and silent), arithmetic, handwriting, spelling, and language. This may be considered the chief responsibility of the elementary school, at least in the first six grades, but it is also expected to contribute to the engendering of knowledge and general patterns of conduct.

In the high school the number of specific habits to be engendered is relatively small except in algebra, foreign language, typewriting, stenography, practical and fine arts, and athletics. In the other subjects of instruction knowledge represents an important rubric of objectives. The engendering of ideals and attitudes is also an important responsibility of the high school. In fact, it may be argued that this constitutes its chief responsibility. However, the acceptance of this thesis does not mean that high-school teachers should limit their immediate objectives to general patterns of conduct.

The fact that knowledge is an adaptive control of conduct gives it importance. Obviously it is not possible to anticipate all of the situations to which adults will be called upon to respond and to equip children for them by engendering only fixed controls of conduct. Even if all possible situations of the future were known, some of them would occur so infrequently in the lives of most persons

that it would be inadvisable to attempt to engender ready-made responses for them. Hence knowledge is an important type of equipment for efficient performance of many duties of adult life. However, the possession of knowledge is not sufficient to insure satisfactory conduct when one encounters difficulties. The functioning of knowledge is governed by ideals and attitudes. These furnish "mind-sets" that form the basis of satisfaction and dissatisfaction in the functioning of knowledge elements in the solving of problems. A person who is grossly lacking in ideals and attitudes would be likely to respond to novel situations in a very erratic manner even though he possessed much knowledge.

Achievement versus the doing of learning exercises.¹—In arriving at a clear understanding of immediate objectives, it is necessary to distinguish between "learning activity" and "achievement" or the changes produced in the learner by the activity in which he engages. The material product of a student's learning activity usually has little or no direct value. The themes written in English classes, the solutions obtained to problems in mathematics, the manipulations of apparatus in the laboratory, the answers given to questions in the classroom, and other learning performances required of students seldom contribute directly to the welfare of those giving them or to the welfare of the community. The themes seldom contain anything original; the problems usually have already been solved by others; the answers to the questions are generally known; "experimenting" in the laboratory seldom results in discoveries. In the shop, and sometimes in the labora-

¹This topic and those immediately following are discussed at some length by: MORRISON, H. C.—*The Practice of Teaching in the Secondary School*. Chicago: The University of Chicago Press, 1926, Chapters II, III, and IV.

tory, the product of learning activities may have a value, but in general the doing of learning exercises is merely a means to an end, the education of students.

The outcomes of the learning process are subjective. One cannot tell by looking at a student what changes have been made in his mind. His knowledge cannot be measured directly by means of a yard stick or other instrument similar to those used in making physical measurements. We can know his abilities only through his conduct or performance. Consequently, in evaluating achievement the teacher necessarily deals with performances.¹ In seeking to learn about a student's achievements teachers frequently ask, "How many problems have you solved?" "Have you read the number of pages assigned?" "Did you find an answer to all of the questions I dictated?" "Have you written up the experiment that you performed in the laboratory?" "Have you translated all of the sentences assigned?" The unfortunate thing about such inquiries is that they tend to be interpreted literally by both teachers and students. The teacher should think of a student's responses to such questions as a convenient though indirect and frequently very inaccurate way of telling what he has learned. The student should consider his answers as only a description of his learning activities. The number of problems a student has solved is in itself unimportant. One student may obtain correct answers for all of the problems and learn little or nothing about how to solve problems, while another student may solve only a few problems but learn much about problem solving. A student who reads the entire number of pages assigned may have learned much less than one who has read only half of the assignment.

¹The measurement of achievement is considered in Chapters XV and XVI.

It is not intended to imply that it is inappropriate for the teacher to ask his students about the number and magnitude of their learning activities, but he should consider this procedure only as a means for ascertaining what they have learned. Many teachers keep an elaborate record of student performances which shows the number of exercises completed by each student and a description of the quality of the performance. Such records may be convenient but they tend to place the emphasis where it should not be. A record of "ability to do" would be much more significant.

Specifications of the quality of abilities.—A classified list of abilities to be engendered does not constitute a complete statement of the teacher's immediate objectives. The desired quality of the abilities enumerated should also be described. The bond between a situation (stimulus) and a response may be formed with varying degrees of strength. Ability to operate a typewriter may vary from that represented by typing only a few words per minute to the degree of skill possessed by an expert typist. "Knowledge of a principle" varies from a hazy understanding of it plus ability to repeat it orally or in writing to the ability to apply it in solving difficult problems. Hence, the enumeration of the abilities to be engendered should be supplemented by the specifications of the quality of each.

"Mastery" of knowledge as an objective.—A person who merely memorizes a statement has acquired the symbols of knowledge. He does not understand their meaning, or at least only to a slight extent. A somewhat higher level of learning is attained by one who "understands" the statements which he is able to repeat. He has acquired ideas, not merely symbols. A still higher level is attained when a learner associates his "new ideas" with other

knowledge and becomes conscious of their relationships. He is able to explain and to illustrate his statements. He is not dependent upon the language of the author but can express his ideas in his own words. His learning is described as "thorough." "Mastery" has been used to designate a still more advanced stage of learning which emphasizes organization of knowledge as well as thoroughness of understanding.¹

("Mastery" as an objective means that the teacher emphasizes the organization and use of knowledge rather than merely its acquisition.) It is a common observation that students frequently fail to apply what they know, or do so very unsatisfactorily. In many cases they are unable to recall facts and principles needed because their knowledge is not well organized. In other cases a truer statement of existing conditions would be that the students have only memorized symbols of knowledge and consequently have no real knowledge to apply. One cause of this condition is the failure of teachers to set objectives that emphasize use of knowledge. The concept of "mastery" as an objective emphasizes the distinction between performance and achievement which we have already pointed out. "Mastery" focuses attention upon the outcomes of learning activity rather than upon the doing of learning exercises.

Permanency of controls of conduct.—The education of a child looks to his future. Although his school experience may constitute an important phase of his present life and thereby add to his present happiness and well being, the

¹"When we say we have mastered a subject, we mean that we have not only amassed all the available matter, but have rearranged that matter so as to have it in an organized form, in which each element occupies its true relation to all the others." ADAMS, JOHN.—*Exposition and Illustration in Teaching*. New York: The Macmillan Company, 1910, p. 187.

fundamental justification of our schools, particularly our high schools, must be derived from the preparation that students receive for participation in the activities of adult life. This means that the teacher must endeavor to engender controls of conduct that possess sufficient permanency to be effective five, ten, or twenty years after the period of the child's education.¹ Specific habits tend to deteriorate when not used. Ideas, facts, and principles that are not mastered and well organized are usually quickly forgotten. Ideals, and particularly attitudes, interests, and tastes tend to be more permanent. Religious beliefs, political affiliations, hobbies, interest in music, a fondness for out-of-door sports, an attitude of fair-mindedness, and the like are frequently acquired in childhood and persist as effective controls of conduct throughout life. Hence, when knowledge is the objective, "mastery" and organization should be emphasized. Furthermore, ideals, attitudes, interests, and tastes should occupy a prominent place in the objectives of high-school teachers. Otherwise the school will fail to fulfill its function because the outcomes engendered will deteriorate and atrophy so that they will not be effective in controlling conduct in adult life.²

How to state immediate objectives.—A number of specific habits can be described by saying "ability to ——" at a specified rate and with a specified degree of accuracy. For example, in typewriting the immediate objective might be, "ability to type simple prose from copy at the rate of

¹An exception to this statement may be made in the case of abilities that are utilized as a means in acquiring other abilities specified as immediate objectives.

²See: MORRISON, H. C.—*The Practice of Teaching in the Secondary School*. Chicago: The University of Chicago Press, 1926, Chapter II. Morrison attaches much importance to the permanency of abilities. He asserts that the only *real* products of learning are permanent.

25 words per minute with not more than 2 errors per hundred words." It is also relatively easy to state objectives for fixed associations, i.e., material which is to be memorized. It is more difficult to describe knowledge objectives. Certain types of this class of objectives may be stated as "ability to explain ———," "ability to describe ———," "ability to use ———." Since knowledge is an adaptable control of conduct, one cannot specify the particular situations to which the student should become able to respond, but in some cases it is possible to describe the general type of situation. For example, in physics, a knowledge objective might be "ability to solve such problems as ———." A general pattern of conduct can usually be described as a tendency or disposition.¹

An illustration of stating immediate objectives in algebra.—Dalman² has described a set of immediate objectives in first-year algebra for the topics of addition, subtraction, factoring, simultaneous equations, and quadratic equations. For each topic four lists of exercises were assembled and labeled C, B, A, and A+, in accordance with the system of school marks employed. The exercises in any one list were judged to be approximately equal in difficulty, but as suggested by their labels the successive lists for any topic increased in difficulty.

These lists of exercises define standards of achievement for the topics of first-year algebra. The goal set for a student is not the doing of so many exercises but the attainment of the ability to do exercises of a certain kind and difficulty. When a student thought he had acquired suffi-

¹The stating of immediate objectives is taken up again in Chapter XVII, which is devoted to the topic of lesson planning. If the brief discussion given here seems inadequate, the reader should turn to Chapter XVII.

²DALMAN, MURRAY A.—"Hurdles, a Series of Calibrated Objective Tests in First Year Algebra," *Journal of Educational Research*, 1: 46-62, January, 1920.

cient habits and knowledge to do the C list of exercises on a certain topic, he was given an opportunity to do so. If he failed to do these exercises correctly he knew that he had not yet attained the goal set for him and he was directed to engage in doing learning exercises in order to acquire sufficient ability to pass the first hurdle. After he had demonstrated that he possessed the ability to do the C list of exercises he was assigned other learning exercises to engender the additional ability required for the B list, and so on.

An illustration of immediate objectives in terms of exercises to be done.—In a class in ancient and medieval history the instructor divided his assignments of topics for notebook work into four lists. For example, on the “Downfall of the Republic” the assignment was as follows:

LIST I

1. List the classes of society during this period.
2. Name the leaders of this century and designate the most important services of each.
3. Summarize the wars of Rome and show what was gained or lost by each.
4. List the triumvirates of the period and show why each was formed.
5. What Latin writers made this century famous? Show how.
6. Prepare a three-page biography of Julius Cæsar.

LIST II

7. Prepare a biography of Cicero. (3 pages.)
8. Outline Section 83 in Breasted, *Ancient Times*.

LIST III

9. Outline Section 84 in Breasted, *Ancient Times*.
10. Write biographical sketches of Marcus and Sulla.

LIST IV

11. Outline Section 85 in Breasted's *Ancient Times*.
12. Outline ten pages from Davis's *Readings*, pp. 103-42.
13. Outline ten pages from Monroe's *Source Book*.
14. See your teacher for a special project.

In order to receive a grade of D, the lowest grade recognized by the school as passing, the student was required to do satisfactorily all of the exercises in List I; for a grade of C, all in List II in addition to those of List I; for a grade of B, List I plus List II plus List III and so forth. This illustration for history, unlike that given for algebra, does not define standards of achievement in terms of ability to do. The explicit objective is to do certain exercises rather than to acquire certain abilities. However, the acquisition of knowledge objectives is implicit and could easily be called to the attention of the students. The topics in List IV, required for a grade of A, are not materially different in kind or in difficulty from those in List I. However, in history the amount of information obtained increases one's understanding of the subject, and the students who completed all four lists undoubtedly acquired more knowledge than those who did only a few of the exercises.

An illustration of general objectives.—Although the teacher should formulate his immediate objectives in terms of the abilities to be engendered, he may properly make certain explicit specifications in regard to the character of learning performances. The following formulation¹ was

¹BAILEY, W. A.—“The Administration of Quantitative and Qualitative Credit for High-School Work,” *The School Review*, 25:309-10, May 1917. A few minor changes have been made in the wording of the statement quoted, in order to assist the reader in understanding them when removed from the original context.

worked out by the faculty of one high school and printed on placards which were posted in the various rooms of the building. One feature of these objectives is their organization.

Specifications for a Grade of C.

1. *All the work asked of all the class*, such as laboratory notebooks, themes, oral and written tests, exercises, map-books, book reviews, notebooks, translations, etc., must be handed to the instructor before any credit will be given.

2. This work must be reasonably neat and accurate. *Poorly spelled and illegible work* cannot be accepted for credit.

3. *Good attention and steady employment* during the class hours are required of all pupils who are given credit for a course.

The quality of the work for a grade of C should be 75 per cent perfect.

Specifications for a Grade of B.

1, 2, 3 as previously given.

4. The average of all test grades must be 85 per cent perfect.

5. Pupils securing this grade must show some initiative in attacking new work, i. e., they should, by consulting such aids as a dictionary, indexes, collateral texts, etc., by reviewing what they have already learned, and by paying careful attention to the assignment, be able to get the advanced work without *much help* from the teacher.

6. In every particular the quality of the work for a grade of B should be superior to the quality of the work for a grade of C.

7. Satisfactory recitations should be made without the aid of the teacher.

The quality of the work for a grade of B should be 85 per cent perfect.

Specifications for a Grade of A.

1, 2, 3, 5, 7, as previously given.

8. The average of test grades must be 95 per cent perfect.

9. Persistent daily preparation of assignments with but little urging and with but little help on the part of the teacher.

10. *Accuracy, neatness, legibility, correct spelling* must be the distinguishing characteristics of the work graded A.

11. The *quantity of work* done by a pupil receiving grade A should exceed that done by a pupil receiving grade B or C.

The quality of the work for a grade of A should be 95 per cent perfect.

Adjustment of objectives to individual differences.¹—

When we remember that usually the students grouped together for instruction will vary greatly with reference to their capacity to do school work, several questions arise relative to the adjustment of immediate objectives to individual differences. Should a teacher set the same objectives for all students? If he attempts to secure "mastery" what is to be done with children who are dull or slow to learn? What is to be done with the very bright? Should the standards of achievement be such that no student will fail?

The usual practice is to set the same objectives for all students taking a given subject and then to describe the degree of their attainments by the grades awarded them. The best students in the class are given a grade of A, signifying a degree of achievement which in some cases approaches "mastery." Others are given a grade of B, signifying a somewhat lower degree of achievement on the same topics. Grades of C and D signify still lower degrees of achievement. All students, however, have studied the same topics and to a considerable extent have attempted the same learning exercises. Their performances on these exercises may approach equivalence in quantity but it is obvious that their achievements will exhibit qualitative differences.

The practice described in the preceding paragraph has

¹This topic is treated more fully in Chapter XII.

been severely criticized because under it few if any students other than those receiving a grade of A or B, approach the level of achievement which we have described as "mastery." The result is that those who fall short of "mastery" do not learn anything well. It has been asserted that "half-learning" predominates in our schools. A habit, or an item of knowledge which is not learned well enough so that it can be used has little or no value. Therefore, it is contended that we should adjust our objectives to individual differences so that the less capable of our students will approach "mastery" of the topics which they undertake. The same point of view is expressed by saying that the adjustments of objectives to individual differences should be quantitative rather than qualitative. This would necessitate that the number of topics studied be adjusted to suit the student's capacity to learn or that the time be appropriately varied. Some "mastery" enthusiasts assert that under an appropriate formulation of immediate objectives no student should "fail," although some students might require a much longer time than others to complete the minimum list of topics.

In the illustration of objective standards of achievement in first-year algebra, an adjustment of objectives to individuals might be secured by requiring all students to acquire ability to do the exercises of the C lists. When a student had attained this objective on a given topic he should be advised to continue his learning and attempt to attain the higher levels of achievement, unless it appeared that he might employ his time more profitably by beginning on a new topic. In the illustration of general objectives it was implied that an adjustment would be secured by assigning additional topics for study to the more capable students.

Training in the art of learning as an objective.¹—Prior to about 1900 “general training,” commonly referred to as “formal discipline,” was regarded as the paramount objective of education, particularly of that given in the intermediate grades and the high school. It was contended that the study of certain highly organized school subjects, such as mental arithmetic, English grammar, algebra, geometry, and Latin grammar would result in training the mind so that one would be more efficient in doing other types of work. Beginning about 1890 this point of view was vigorously attacked with the result that there was a general reaction from the doctrine of formal discipline.² Since 1900 there has been a definite tendency to emphasize the character of content³ of the subjects taught in our schools and to make it practical. In recent years it has been considered highly important in formulating a course of study, or in writing a textbook, to limit the content to subject-matter that could be shown to be directly useful in certain adult activities.

This movement on the whole has been very beneficial to our schools, but it has been accompanied by a tendency to minimize or even to neglect certain important by-products of learning of which “training in the art of learning” is one. A student learns by doing. We ask him to answer questions, to read textbooks, to solve problems, to prepare written reports, and to do other learning exercises. If he is to be efficient as a learner he must be trained

¹The teaching of study habits is considered in Chapter XIII.

²For discussions of formal discipline see: BAGLEY, W. C.—*Educative Process*. New York: The Macmillan Company, 1905, Chapter XIII. JUDD, C. H.—*Psychology of High-School Subjects*. Boston: Ginn and Company, 1915, Chapter XVII. FREEMAN, F. N.—*How Children Learn*. Boston: Houghton Mifflin Company, 1917, Chapter XIII.

³Except for a few subjects this content is largely knowledge.

in the art of learning; that is, he must be trained in the art of answering questions, in the art of reading a textbook, in the art of solving problems, and in the art of preparing a written report, and so on. "Good form" is considered essential for excellence in swimming, golf, baseball, and other sports; "good form in learning" is also essential for excellence in algebra, history, foreign languages, and other school subjects. Some students seem to grasp the art of learning easily and with little or no specific training by the teacher and gradually develop an effective technique, but the great majority of students fail to acquire a technique that enables them to be efficient in doing the learning exercises that the teacher assigns.

A teacher's efficiency depends upon the effectiveness of his students as learners. For this reason, if for no other,¹ the teacher should recognize training in the art of learning as one of his important objectives. He should teach his students to read the textbook in the way it should be read. If in a particular course the textbook is to be read carefully, with attention to concisely formulated sentences and paragraphs, the student should be trained in this type of reading. If the textbook is to be read merely for the purpose of finding answers to assigned questions, then the teacher should train his students to do this kind of reading well.² If the teacher asks his students to prepare themes or other written exercises, he should train them in the art of doing these things. Each teacher should assume the responsibility for making certain that his students become skilful in doing the particular types of learning exercises he assigns.

¹Training in the art of learning can be justified as an objective on other grounds.

²This point is elaborated in Chapter VII.

A teacher's real objectives implied in the learning exercises assigned and his tests of achievement.—The formal statement of immediate objectives to which a teacher subscribes does not necessarily specify the one toward which he directs his students. His real objectives are implied in the learning exercises he assigns, and in his tests of achievement. This statement means that the goals toward which a teacher is directing his students are determined by the exercises he asks them to do, including the questions asked during the recitation period, and the tests he administers. The teacher who asks questions calling for mere factual answers, implies the objective of memorizing isolated facts. The teacher who quizzes students on the text, implies the objective of learning the textbook, which is usually interpreted to mean "memorizing the language of the author." The teacher who emphasizes reasons why, cause and effect, comparison, and organization of information implies very different objectives. The teacher of mathematics who stresses correct answers and neglects the procedures by which the answers are obtained implies objectives different from those implied by another teacher who emphasizes the methods by which the student arrives at his answers.

The general principle expressed in the preceding paragraph is one of major importance in considering the immediate objectives of teachers. The formulation of objectives has received emphasis in the activities of educational associations. Several pretentious investigations have been devoted largely or wholly to the determination of the "best" objectives. Such endeavors are commendable but it is necessary to bear in mind that mere "paper" objectives will not affect the work of our schools. When teachers are asked, they are frequently able to state approved

objectives. In some school systems they are required to keep a "plan book" and one of the specified items of the plan is the "aim of the lesson." However, observers of actual teaching report that in many instances the objectives implied by the learning exercises, particularly the questions asked, and by the evaluation of student performances are very different from those stated by the teacher.

Comparison of "paper objectives" and the objectives implied by learning exercises.—In a recitation in English literature which the observer¹ states is not an extreme case, the teacher began the work of the hour by making the assignment for the next day as follows: "Next time please outline the life of Macaulay and read all of Macaulay in this book." Following this statement, an ode composed by a member of the class was read. Then the teacher began a rapid-fire questioning which may be illustrated by the following samples:

As a romanticist, what qualities do you think Wordsworth possessed?

What other romantic element besides power of description?

What other poet wrote on nature?

What differences?

Does any other element enter in?

How does Coleridge introduce the supernatural?

Describe the "Phantom Ship."

Who was "Life in Death"?

In what poem did she appear?

Will you describe her for us?

What feature was so particularly striking?

What color words did he use?

How did he express his ideas on red?

What else?

Lillian, did you have any other color in mind?

¹The writer is indebted to Chas. W. Knudsen for this and the other reports reproduced in this chapter.

When?

In the story of the "Ancient Mariner," did he tell the story so that the reader felt he had been on a journey?

How did he hold the wedding guest?

How did he first hold him?

How many guests were walking in this path?

Now coming to Keats, was Keats a nature poet?

To what extent?

If you were to compare Coleridge, Wordsworth, Shelley, and Keats, which one has keenest insight into nature?

Why do you think so?

How about Shelley?

A total of seventy-eight such questions were asked and answered before the gong sounded at the end of the period, i.e., within less than forty minutes or at the rate of about two per minute. One may properly ask: What kind of learning exercises did this teacher ask his students to do? What kinds of mental activity did they engage in? What did they learn? A study of the complete list of questions suggests a classification under three general types. A number of them explicitly call for factual answers which a student would learn by reading his text. The following are samples of this type of question:

In what poem does "Life in Death" appear?

Was Keats a nature poet?

Did Shelley use flowery words?

Who had a morbid outlook on life?

Other questions required students to make inferences but the answers which the teacher accepted were essentially factual. Samples of these are:

As a romanticist what qualities does Wordsworth possess?

What elements of the romantic movement do we find in the poem of St. Agnes?

What do you suppose Wordsworth believed regarding religion?

A third class of questions is composed of those that require students to explain; such as, "How does he (the poet) express his ideas on red?" "How did the Ancient Mariner hold the wedding guest?" "What does 'like a star of Heaven' mean?" "Who are 'the heavy-winged thieves'?"

The first of these three types of questions implies the objective of memorizing specific facts with little or no attention to their relation to other facts. The second and third types of questions imply the objective of understanding certain aspects of the poems to which they refer, but it is likely that the knowledge resulting from answering such questions would be lacking in richness of association and organization.

In response to the request of the observer this teacher of English literature stated her aim as being to engender "the ability to recognize good literature and understand and appreciate it." Although this aim is stated in general terms, the lack of agreement between it and the objectives implied in the questions asked and the assignment for the next day's lesson is obvious. The report of this observer furnishes a good illustration of the failure of a teacher to recognize that his real objectives are implied in the exercises he asks his students to do. Apparently this teacher was unaware that she was stimulating her students to work toward objectives that are incompatible with the general aim she stated.

Another comparison of a teacher's "paper objectives" with his real objectives.—A teacher of general science stated his aims as follows:

1. To interest pupils in other sciences, especially chemistry.
2. To stress the practical applications of facts and principles from the textbook.
3. To cultivate an attitude in the minds of the students that

problems do exist and to suggest some methods of attacking these problems.

During the first part of the recitation period this teacher asked thirty-three questions such as the following:

What topic are we discussing to-day?

What is the first thing that we take up in the discussion of heat?

How do we get our heat?

What are some of the different fuels?

Some others?

Chester, discuss the formation of coal.

Are we having much coal formed to-day?

Can you explain?

With what did formation of coal start?

Do you think our vegetation is so luxuriant?

Would this make any difference?

Kenneth, can you give us something on this?

What name do we have for the first coal?

The next?

The next?

How do we distinguish between anthracite and bituminous coal?

If you are making illuminating gas, what coal will you use?

What are three methods for distributing heat?

Irene, what is conduction?

Can you think of any examples?

Gladys, can you think of any?

Think over this and see if you can think what is happening to the molecules.

James, how is heat distributed by convection?

Harold, can you add anything?

By what method is heat distributed by the sun?

Would you say it moves in currents?

Is the space through which the rays pass hot or cold?

Do you agree with that, Harold?

Do you remember when we discussed the color of radiators?

Why did we decide on a dark-colored radiator?
 Will anything be warm unless it absorbs heat?
 Does this space absorb heat?

Following this questioning, the class was divided into five groups and directed to write discussions of certain topics on the board. The following is a sample:

Heating by means of stoves: Fifty years before the War we had an ordinary stove which was round and it was made of iron and had a door at the bottom and one at the top for the smoke to go out. Then Franklin invented a stove which was a fireplace and it was a fireplace with another iron fireplace inside it. To have the heat the way you wanted it, there was a damper used to regulate the temperature.

After the students had finished writing on the topics assigned, certain ones were called upon to read the discussions they had written. After the reading of a discussion the teacher asked questions relative to the topic. The following are representative of those asked on the topic "Heating by means of stoves."

What was the purpose of the door at the top?
 What was the purpose of the door at the bottom?
 Why was Franklin's invention better than the old method of fireplace?
 Where did a lot of the heat go?
 How was Franklin's stove an advantage?
 How did it keep the heat inside? (The teacher then read a description of Franklin's stove.)
 Tell me more about the stoves of to-day.
 Can you see any reason for letting the oxygen in at the top instead of at the bottom?
 How many agree?
 Does anyone see a reason for having the draft at the top?

The assignment which was given just before the bell sounded was: "To-morrow the assignment will be in Fall, page 247, and exercises 8, 9, 10, 11 to radiant heat. Pay particular attention to the questions and be sure you know what to do when you come to class."

It is difficult to identify the particular objectives which the questions and other exercises of this recitation imply, but there appears to be considerable emphasis upon memorization of the text. Some of the questions asked might have furnished a basis for reflective thinking but the total number asked is so great that much reflective thinking was not possible. This case furnishes another illustration of a conspicuous disagreement between a teacher's "paper objectives" and those implied in the exercises he asked his students to do.

Objectives implied in tests of achievement.¹—A teacher also reveals his objectives in the tests and examinations he gives. In some schools it is the policy that only questions and exercises that the students have explicitly studied during the term shall be included in the final examination. Some teachers are accustomed to give their students a long list of questions a few days prior to the final examination with the understanding that the examination will consist of questions taken from this list. Where such policies prevail students feel that they have demonstrated the unfairness of an examination when they show that it includes new exercises.

The policy that no new questions are to be asked on a final examination, and particularly the practice of furnishing students with a list of questions, implies that the objectives of the course are to be attained by memorizing the responses to be given to particular questions. Although

¹The measurement of achievement is treated in Chapters XV and XVI.

memorization is involved in acquiring knowledge, evidence of the possession of knowledge is furnished by responding to new situations, by overcoming difficulties, and by solving problems. When a student answers a question by remembering how he answered it, his performance possesses little value as evidence of his knowledge. In fact, it merely constitutes evidence that he has memorized certain responses. Hence tests and examinations which do not include some new questions, imply specific habit objectives rather than knowledge objectives. If a teacher wishes to measure the knowledge achievements of his students he must include at least some "new" questions in the examination he gives.

LEARNING EXERCISES FOR THE READER

1. In what terms should a high-school teacher formulate his immediate objectives? Of what value to him is Bobbitt's analysis of the activities of adult life? Why should a teacher seek to understand the ultimate objectives of education?

2. In view of the changing social and economic conditions and the migration of our population, how important are adaptive controls of conduct?

3. Write down ten illustrations of each of the types of controls of conduct given on page 30f.

4. What differences are there between the purpose of education in Grades I-IV and its purpose in Grades VII-XII? In answering this question it will be helpful to recognize the distinction between fixed and adaptive controls of conduct.

5. Give from your own experience as a student five illustrations of "mastery." Give five illustrations of "half-learning."

6. Is learning an art? Have you become skilful in doing particular types of learning exercises, such as memorizing a poem, answering thought questions, listening to a lecture, expressing your ideas in writing, reading a textbook, etc.? Write down a

list of the learning exercises in the doing of which you believe your skill is above average. Do you find that your skill in these aspects of learning is an asset? Why?

7. How important is it for the teacher to recognize training in the "art of learning" as an objective?

8. Write down a list of immediate objectives in terms of controls of conduct for two high-school subjects. Classify these controls of conduct as suggested on page 30f. (This is an important learning exercise. It will be referred to in some of the later chapters. It is more important that the lists of conduct controls be representative than that they be complete.)

9. What types of learning exercises imply an objective which consists of specific habits? Justify your answer.

10. What types of learning exercises imply "mastery" as an objective? Justify your answer.

11. Distinguish between the two terms "immediate objectives" and "ultimate objectives," and give five examples of each.

12. William James says "The aim of education is to make useful habits automatic." Give your interpretation of this statement and illustrate.

13. What educative influences besides those of the school contributed largely to your education? Did you feel that any students in your class were handicapped because outside educative influences were lacking in their lives? Did your school make an effort to better conditions of the home or of the community so that the education from non-school sources was improved? If so, in what ways?

14. Spencer¹ in his essay, "What Knowledge Is of Most Worth" gives the following activities as the leading ones that constitute human life:

1. Those that directly minister to self-preservation.
2. Those that, by securing the necessities of life, indirectly minister to self-preservation.
3. Those that have for their end the rearing and discipline of offspring.
4. Those that maintain proper social and political relations.
5. Those that make up the leisure part of life.

¹SPENCER, HERBERT.—*Education*. New York: A. L. Burt Company.

Compare the activities just listed with those designated as the seven cardinal principles of secondary education, and also with Bobbitt's list. See pages 52 and 56.

15. From your study of this chapter define and illustrate the following terms: control of conduct, motor skill, knowledge, objective, achievement, performance, individual differences, formal discipline, specific habit, fixed associations.

16. Darwin in his autobiography makes a statement that has been often quoted. "Up to the age of thirty or beyond it, poetry of many kinds gave me great pleasure; . . . I have also said that pictures formerly gave me considerable and music very great delight. But now for many years I cannot endure to read a line of poetry. . . . I have also almost lost my taste for pictures and music. . . . If I had my life to live again I would have made a rule to read some poetry and listen to some music at least once every week; for perhaps the parts of my brain now atrophied would thus have been kept alive through use."

Have you considered the permanency of controls of conduct engendered in your school life? Which controls would you wish especially to persist throughout life?

William James says "Ten minutes a day of poetry, . . . and an hour or two a week of music, pictures, or philosophy would infallibly give us in due time the fullness of all we desire." Having made a list of the most desirable controls of conduct (for you), what can you do to guarantee their permanency?

CHAPTER IV

MOTIVATING THE DOING OF LEARNING EXERCISES

The problem of motivation.—In Chapter I the teacher's task was described as "stimulating and directing students in appropriate learning activities." In Chapters II and III we considered the nature of learning activity and the objectives that should guide the teacher in devising and selecting exercises. We now come to the question, "How can the teacher most effectively stimulate his students to do the exercises he assigns?" Before considering this problem,¹ we shall note certain general factors that affect the motivation of learning activity.

Learning activities not naturally distasteful to children.—Some treatments of the topic of motivation tend to imply that in general students dislike to do the learning exercises assigned by the teacher, and consequently he continually faces the task of stimulating them to do things which otherwise they would avoid. Such is not the case. Many school tasks are immediately interesting to high-school students; and as soon as the assignment is made, there is sufficient motive to start the learning activity. In some instances students work with enthusiasm in doing a difficult exercise or one that extends over a period

¹The reader should bear in mind that the discussion of this chapter assumes the assignment method. See page 5. However, as will be pointed out in Chapter XIV, the teacher should be sensitive to student purposes and capitalize them in so far as seems appropriate.

of several days or even weeks. In many classrooms a lack of motive is the exception rather than the rule. On the other hand, it is true that if left to their own initiative, students probably would not do voluntarily many of the tasks assigned in school. It is also true that some students dislike school work.

The teacher should approach his task of securing a motive for the doing of learning exercises with the attitude that his students are not hostile toward school work and that if appropriate learning exercises are presented in the right way and at the right time, it will not be difficult to secure the necessary impelling force to get them done. The writer does not intend to imply that the teacher should not take seriously this phase of his task or that it is unnecessary for him to plan carefully the procedures he employs in stimulating school work. It is necessary to secure a strong motive, but many teachers appear to make this phase of their work more difficult than necessary and in some cases bring about their own failure because they assume that they are trying to get students to do things that are distasteful to them. This attitude tends to create a contest between a teacher and his students in which the students are likely to win.¹

The basis of motive.—The source of the power that produces activity is within each student. Although we are accustomed to say that the teacher motivates school tasks or makes them interesting, he can only set the stage and provide certain stimuli; the students must do the rest. It is characteristic of children to be active. The normal healthy child seldom approaches inactivity unless he is asleep. To the stream of stimuli which impinge upon his consciousness he responds in ways determined by his

¹The teacher's attitude is considered again on page 107.

original nature and acquired tendencies.¹ For example, the presence of a ball and bat results in playing ball; a slap from a playmate is followed by a retaliating blow; a circus poster stimulates discussion of the coming performance and perhaps a search for ways and means for securing the price of admission; a question is the cause of an answer, perhaps of one requiring reading and study; a radio possessed by a friend leads to the construction of one. Such stimuli as these seem to tap a source of driving force that operates the child's physical, mental, and emotional machinery. The teacher's task is to provide stimuli in the form of directions, questions, problems, illustrations, explanations, criticisms, suggestions, commendations, rewards, admonitions, punishments, etc., which will release the driving force necessary for an earnest and persistent attempt to do the learning exercises assigned.

Learning exercises a factor in motivation.—The character of the learning exercises the teacher assigns materially affects the task of motivating the doing of them.² Some exercises are immediately interesting; that is, as soon as they are assigned, students are willing or even eager to do them; other exercises are uninteresting or even potential sources of annoyance. In general, exercises relating to material things are more interesting than abstract ones. Exercises that specify definite things to be done are usually

¹For a discussion of original nature and acquired tendencies see: MONROE, WALTER S. and DE VOSS, JAMES C.—*Educational Psychology*. Garden City, N. Y.: Doubleday, Page and Company (to be published). GATES, A. I.—*Psychology for Students of Education*. New York: The Macmillan Company, 1923, Chapters VI and VII.

²This statement refers only to the intrinsic characteristics of the exercises. The task of motivation is also affected by the relation of the exercise to the student's "frame of mind" or mind set at the time when it is assigned and to his purposes at the time. This point is treated beginning on page 90 under the head of "Stimulating the doing of learning exercises by creating a need."

more interesting than requests that are lacking in definiteness. Easy exercises are not necessarily interesting. Sometimes difficult exercises make a much stronger appeal to students. The manner in which exercises are assigned and the directive procedures employed also affect their motivation.

The purpose of motivation to stimulate educative activity.—Although learning is an active process, all activity does not contribute to the acquisition of the controls of conduct specified by immediate educational objectives. A teacher should not infer that because his students are active physically, mentally, or emotionally, they are learning what they are expected to learn. Unless the teacher is successful in stimulating appropriate activities he has failed as an instructor even though his students may have been far from idle. For example, it is urged that students be encouraged to ask questions, but the asking of questions is not certain evidence of appropriate activity. Frequently students ask questions in order to lead the teacher to talk about something not directly related to the lesson so that they may escape being called upon to recite. Occasionally, a classroom is found in which there is much waving of hands whenever the teacher asks a question. Such physical activity, which is intended to indicate mental activity, is not conclusive evidence that the students have thought out the correct answer. The writer has observed classes in which the students gave much “evidence” of activity but when they were called upon they showed plainly that the activity was not educative. In class discussions students sometimes give their attention to thinking up clever or “smart” comments rather than pertinent contributions to the discussion.

Adaptation of motivation techniques.—A technique

which is successful in stimulating certain students to do assigned exercises may not be successful with other students. For example, some students may respond to the suggestion that a certain exercise is difficult by regarding it as a challenge. Other students may be indifferent to the same suggestion. Furthermore, a technique which is effective on some occasions may fail on others. Some teachers may find certain techniques successful which other teachers find ineffective. For example, certain motivation techniques that are widely used by athletic coaches would be entirely out of place and would result in dismal failures in the classroom. In securing motive, as well as in other phases of a teacher's task, it is necessary for him to adapt his techniques to the individual differences of his students. He must also adapt them to the organization of the textbook he is using. For this reason he should cultivate resourcefulness in motivation and avoid overworking any one procedure.

Relation of motivation to other phases of teaching.—Although motivation is being considered in this chapter as a separate phase of teaching, the reader should constantly bear in mind that the work of the teacher is a unified task. The stimulation of learning activities is affected by the kind of exercises devised by the teacher and the techniques he employs in assigning them. The interest of students in their work is also affected by the direction they receive, especially the evaluation of their performances. A teacher's success in stimulating the necessary driving power depends to a large extent upon his skill in performing these other phases of his task. Stimulating the doing of learning exercises is isolated from other phases of the teacher's task merely as a means of facilitating its consideration.

Types of motivation techniques.—Motivating the doing

of learning exercises will be considered under the following heads:¹

- I. Stimulating the doing of learning exercises by creating a need.
- II. Securing motive by setting definite objectives and formulating definite learning exercises.
- III. Motivating school work by engendering interests and ideals.
- IV. Securing motive through emulation.
- V. Securing motive through fear of punishment or ridicule.

I. STIMULATING THE DOING OF LEARNING EXERCISES BY CREATING A NEED

Definition of need.—A person has or feels a need when he recognizes his inability to possess or control something he considers valuable.² This “something,” commonly called a value, may be a material object such as a bookcase to be constructed in the shop, a dress to be made in the sewing room, and the like. In some cases it is an ability describable in relatively objective terms such as ability to play well enough in order to make an athletic team; ability to solve certain problems or to do other school exercises in a way that will secure the esteem of classmates as well as the approval of the teacher; ability to attain cer-

¹The reader should not infer that there are five independent methods for securing motive. It will be apparent in the following pages that some of these procedures tend to overlap and that it would be possible to reduce the number of headings by effecting certain combinations. It has, however, been judged advisable to organize the discussion as indicated.

²For a more extended definition of need and value see: CHARTERS, W. W.—*Methods of Teaching, Revised and Enlarged*. Chicago: Rowe, Peterson and Company, 1912, Chapter X, also pp. 11-23.

tain standards of conduct outside of school, and the like; but sometimes it is not possible to define the value beyond saying that it is a desire to know or be able to do. A value may be described as anything (material object, ability to do, or a physical, mental, or emotional state) whose control or possession the student has found satisfying, or expects to find satisfying. Thorndike¹ describes certain "original satisfiers and annoyers." These together with "acquired satisfiers and annoyers" constitute the basis of a person's values.

In the preceding paragraph values have been considered from the point of view of the individual student. A thing is valuable because the student finds or expects to find it satisfying. It is obvious that all students do not find the same things satisfying and that changes occur in one's satisfiers and annoyers. Consequently, when considered from this point of view a value is a personal matter. All things are not equally valuable to all students and the values of any student are subject to change. However, we may consider values from the point of view of what is satisfying or annoying to people in general. Those things (material objects, abilities to do, and physical, mental, or emotional states) that contribute to the welfare of the social group, which the school is endeavoring to build up and perpetuate, are values. The distinction represented by these points of view may be indicated by using the terms "active" and "potential" to qualify values.

How to create a need.—Since a need is the recognition of inability to possess or control an active value, the first step in creating a need is to select an appropriate potential value. Then it is necessary to cause the student to become

¹THORNDIKE, E. L.—*Educational Psychology, Briefer Course*. New York: Teachers College, Columbia University, 1914, Chapter IV.

aware of his inability to control or possess this value, and to have confidence in the doing of the exercises as a means of securing possession or control. When this is accomplished, the student feels a need for doing the assigned exercises.¹

Determining appropriate values.—The determination of appropriate values is closely connected with the determination of objectives. Appropriate objectives, both immediate and ultimate, are appropriate values, but in order to make them active, and hence create a need, it is frequently necessary to use potential values that are not explicit in statements of immediate objectives. Hence, the problem of determining appropriate values is not identical with that of formulating objectives.

In determining the values whose appreciation² is desired the teacher should attempt to satisfy three conditions. If the value is to serve as a basis for a need, it must be one that the student will appreciate immediately or can be induced to appreciate. Second, the value must be one that is compatible with our ultimate educational objectives. The final condition is that the relation between the value and the outcomes resulting from the doing of the learning exercises be intrinsic rather than artificial.

The distinction implied in the third condition probably requires explanation. An intrinsic relation exists when the particular controls of conduct resulting from doing the exercises are the only means of controlling the value, or are an efficient means of control. An artificial relation is one that is imposed by the teacher or by the school. For

¹Theoretically this procedure is generally applicable in motivating school work, except in engendering some types of general patterns of conduct. In such cases the necessary motive must be secured by other procedures. See page 106.

²"Appreciation" is used in order to simplify the sentence. It means "recognition of the potential value as promising satisfaction."

example, a place on the football team can be won and retained only by acquiring certain skills in tackling, blocking, running, carrying the ball, etc. The relation between the value, a place on the team, and the outcomes of the learning exercises that the coach asks his players to do is intrinsic. Most schools make an artificial requirement that members of the team shall maintain a certain scholastic standing. The relation between doing assignments in mathematics, history, Latin, etc., and being a member of the team is artificial. The only reason why any relation exists is because the school has made an arbitrary requirement.

The importance of the requirement that the values be intrinsic rather than artificial¹ is due in part to the fact that frequently it is not easy to get high-school students to appreciate worthy intrinsic values and consequently teachers tend to substitute artificial ones, which they already appreciate. It is characteristic of many students not to desire to know about historical characters and events, the laws of physics and chemistry, the meaning of abstract and general terms, the conjugation of a Latin verb; they are not interested in truth, in becoming a master of a topic, in building up an organized and coördinated body of information. On the other hand, they are interested in athletics, clubs, the approval of their schoolmates, prizes, distinctions, grades, parties, playing in the school orchestra or band, publishing a school paper, preparing an exhibit, participating in a class play, reading fiction, making a

¹The term "generic values" is used by CHARTERS, W. W.—*Methods of Teaching, Revised and Enlarged*. Chicago: Rowe, Peterson and Company, 1912, p. 166. It includes "artificial values" but is not synonymous with it. A "generic value" is one that "can be used in a great variety of situations and can be made the basis of motive in a large field of activity." Illustrations are: making a reputation, high grades, doing one's duty, escape from punishment, prizes, approval of the teacher, approval of classmates, and going to college. Legitimate generic values are considered on page 99.

table, floor lamp, or radio set in the shop, cooking in the laboratory, and many other things. The use of certain artificial values, such as the requirement of a certain scholastic standard for eligibility to athletic teams, may be justified; but the exploitation of artificial relationships as a means of motivation is likely to develop an attitude of indifference, if not one of antagonism, toward the school, because the experience of the student tends to convince him that the reason for doing learning exercises is to satisfy requirements that the teacher has made because he has the power to do so. When this happens the teacher defeats one of his most important objectives, the development of a permanent interest in one or more fields of human knowledge. Hence, the creation of artificial needs should be looked upon as only a means for supplementing or reinforcing other means of motivation.

How to secure the appreciation of potential values.—The problem suggested by the paragraph heading may be stated more explicitly as follows: given certain approved potential values that sustain an intrinsic relation to the learning exercises to be done, what should the teacher do in order to get his students to appreciate these values?

Frequently a teacher can start with a value, which is already appreciated, and secure the appreciation of another value by showing that it is essential for the control of the first. For example, if publishing a school paper is an active value, ability to spell correctly, ability to write grammatically correct sentences, ability to describe an event in an interesting way, etc., may be made active values by showing that these abilities are necessary in publishing a school paper. If the making of a table is an active value, ability to make a drawing, ability to read a blueprint, ability to plane a board, and the like, will in turn become active

values.¹ The desire to secure remunerative employment may become the source of subordinate values relating to stenography, typewriting, bookkeeping, spelling, grammar, and even other school subjects. Many young men and women who are engaged in an occupation find their advancement blocked because they lack certain training; hence, the securing of this training becomes an active value. Evidence of this fact is found in the attendance at night schools and in the registration in correspondence courses. Many persons resign their positions to attend high school or college because they have found through experience that such training is necessary in order to advance in their chosen occupation.

As implied in the preceding paragraphs the appreciation of values is like a chain letter.² The appreciation of one value and an endeavor to control it frequently lead to the appreciation of two or more other values that are necessary means for the control of it. The endeavor to control these values leads in turn to the appreciation of other values, and so on. For example, a class formed the purpose of preparing a descriptive history of their city. In its accomplishment they found it necessary to search through records in the city library, to interview citizens, to read accounts already written and finally to organize in an acceptable form the information collected. The dominant purpose of preparing a descriptive history of the city thus became the source of other purposes or values and in this way furnished the motive or driving power for a large number of learning activities. The recognition of the inter-

¹This motivation procedure is essentially that of the project method. See Chapter XIV.

²The term "chain letter" refers to a plan whereby a person writes to a number of his friends, five for example, with the request that each of these write to five other persons and request that each of them write to five others, and so on.

dependence of values suggests a procedure for a teacher when he discovers some value which a student appreciates. He then has a foothold for securing an appreciation for a group of related values. In this way many teachers have succeeded in interesting in their school work boys and girls who previously were indifferent or even hostile toward it.

As suggested in the preceding paragraphs, the teacher must be tactful in securing the appreciation of potential values. Appreciation involves an emotional response. If the teacher attempts to force the matter he is likely to defeat his purpose. Arguing the case tends to place students on the defensive. "Appreciating a value" means that the control of it or the contemplation of controlling it gives one satisfaction. A teacher can only set the stage.¹ If appreciation does not follow he must resort to other procedures in securing the necessary motive. Haste in stimulating the appreciation of values frequently results in waste.

Appealing to instinctive and acquired tendencies to action represents a somewhat different procedure of securing the appreciation of values. For example, a science teacher may describe or demonstrate some phenomenon, such as the production of a gas that burns in air, by pouring diluted sulphuric acid upon zinc. Since children are naturally curious, it is likely that some student will ask, "What causes the gas to be formed?" "Why does the gas burn?" If such questions are not raised by the class, the teacher may be able to stimulate the desire for the knowledge necessary for answering such questions by proposing them himself.

¹A significant illustration of securing the appreciation of a potential value is furnished by Mark Twain's Tom Sawyer who induced his playmates to value the whitewashing of the yard fence. They wanted to perform the task because Tom appeared to want to do it.

When two apparently conflicting facts are brought to the attention of students, they frequently become interested in securing an explanation of the apparent inconsistency. When the proper setting or frame of mind has been created, questions such as "Why?" "How?" "What will happen?" "Can it be done?" frequently secure the appreciation of potential values. A student tactfully approached with the query, "Can you do this task?" or "Do you think you can do it?" will frequently make the "doing" an active value. If the student's "instinct of pugnacity" has not atrophied, such queries will tend to become a challenge to him. The writer has known teachers who occasionally would imply that the task was difficult and not ordinarily done by students possessing the training of his class.¹

Appeal to practical values as a means of creating a need.

—High-school students frequently ask with reference to a school subject or to a topic, "What is this good for?" "How will it help me to do the things I shall be called upon to do when I leave school?" Their concept of the demands of adult life is usually narrow and in asking such questions they really mean "How will this subject or topic help me to make a living?" We pointed out on page 56 that adult life involves many activities that are not directly connected with making a living, and that the school is responsible for equipping students for participa-

¹Bagley cites an interesting illustration. When a history class came to the topic of Arnold's treason the teacher made the assignment as follows: "The next few pages of the book tell about a very mean man. I do not think that I have ever heard of another man so mean and contemptible as he was. I don't know that it will pay us to spend very much time on this man; but, after all, it was a rather pathetic case, and you might read it over this evening." The teacher characterized the next day's recitation as the best he had secured from any class in history. BAGLEY, W. C.—*Classroom Management*. New York: The Macmillan Company, 1907, pp. 202-3.

tion in all types of adult activity. Therefore, it is obvious that many of the things to be learned in school may not directly help one to make a living.

However, a teacher should not be indifferent to the practical value of the controls of conduct to be engendered through the study of the subject he is teaching; and whenever the outcomes of the learning activities sustain an intrinsic relation to certain practical values, he may utilize them as the basis of motive. It is unwise, though, for a teacher to exploit practical values as a basis of motivation because in doing so he is likely to give the impression that any control of conduct that does not contribute directly to the making of a living has little or no value.

Creating a need by a pre-test.—When students already know something about a topic to be studied, a pre-test given as a preliminary to the study sometimes is helpful. This procedure has been used by many teachers of spelling. In assigning a list of words they give a test, and in this way the student's attention is directed to the words that he needs to study. A pre-test is an excellent means of creating a need for a review. Sometimes the asking of appropriate questions will create a need by calling the student's attention to the fact that he lacks certain information or is otherwise unable to give a satisfactory answer. In order that this procedure be effective as a means of motivating learning activity, the teacher must leave to the student the answering of the question asked. When the answer is supplied for him, a student will not feel the need for securing it through his own efforts.

Evaluation of student performances as a basis for a need.—Critical evaluation of the work done has a stimulating effect upon many students, and laxness on the part of the teacher tends to encourage indifference and half-

hearted efforts on the part of students. Every error is a potential source of a need; but unless an error is brought to the student's attention it will not stimulate him to engage in learning activity. If he thinks that rambling and general responses in class will be accepted, he is likely to carry his learning only far enough to be able to give such responses. If he has learned from experience that the teacher will "help" him when he encounters a difficulty, he is likely to develop into a chronic "quitter" in school work.

Motivation through the creation of need dependent upon the psychological order.—One of the secrets of success in securing motives by creating a need is to delay the assignment of a learning exercise until the need for the control of conduct which it will engender has been created. A psychological organization (see page 40) of a subject facilitates this procedure. When the author of a textbook leads up to the application or use of the controls of conduct to be engendered in a "logical order" the learner is compelled to work more or less in the dark. On the other hand, if the author starts with the application or at least gives some clue to it, the learner may immediately feel a need for the study of the topic.

What to do when appreciation of intrinsic values is not secured.—The teacher must get his students to do the learning exercises assigned day by day. If he fails to secure appreciation of values which sustain an intrinsic relation to the controls of conduct to be engendered, he then must resort to other procedures. On occasions, he may create artificial needs by requiring the doing of certain learning exercises as a prerequisite for controlling certain values already appreciated. For example, most children enjoy "passing" in the subjects they are studying. Hence, an artificial need may be created for acquiring certain habits,

skills, knowledge, by reminding students that they will fail in the course if they are not able to do certain test exercises. In a similar way, interest in securing high grades furnishes a basis for a need. If participation in athletic activities is dependent upon the attainment of a certain scholastic standing, those who are interested in athletics feel an artificial need for doing the learning exercises assigned.

Although artificial needs may be employed when other means of motivation fail, or are inadequate, their use should not be exploited. As we have already pointed out, emphasis upon such goals as graduating with one's class, entering college, or being awarded school honors is likely to create the belief that the learning exercises which the students are asked to do have no other value than the artificial one placed upon them by the arbitrary demands of the teacher and the school.

Appreciation of values versus making learning activity interesting.—Many writers have treated motivation in terms of interest instead of need. In most of these cases the emphasis has been upon making the learning activity enjoyable. The teacher was urged to devise exercises that the pupils would like to do or to create conditions so that the doing of the assigned exercises would be interesting, which was usually interpreted to mean enjoyable or pleasurable. For example, most children like to play games but many find the learning of the multiplication table uninteresting. The learning activity required for this achievement may be made interesting by inventing a game in which multiplication is required in keeping the score. In this way learning a multiplication table is likely to become an interesting activity.

In the treatment of motivation by creating a need the emphasis has been upon securing the appreciation of a value that would be controlled by the learning activity or the outcomes resulting from it. The distinction between need and interest is really that between a means and an end. When motivation is treated in terms of interest the tendency is to consider learning activity (the doing of the exercises assigned) as an end; the concept of need emphasizes a value whose control is accomplished by means of the learning activity.

Advantages of securing motive through creating a need.

—There are certain advantages in securing motive by creating a need for the controls of conduct. In the first place, when the values are intrinsic this procedure emphasizes the use of what students learn, and thus tends to make the study of school subjects something more than preparation for a remote and indefinite future. A second advantage is that a student is led to appraise his ability in terms of use and to recognize his lack of ability if he is unable to satisfy the need. Some teachers insist that it is undesirable to direct attention to failures and shortcomings, and claim that students, especially those who are easily discouraged, will be made to feel that it is not worth while to try. Those who take this position point out that success is in itself an incentive and that it is much better to emphasize to the student the things which he is able to do. There is doubtless some validity in these contentions and emphasis upon needs can be carried to an undesirable extreme, but a judicious use of this technique of motivation is one of the best means of securing the driving force necessary for persistent and continued participation in learning activities.

II. SECURING MOTIVE BY SETTING DEFINITE OBJECTIVES AND FORMULATING DEFINITE LEARNING EXERCISES

The appreciation of immediate objectives by students.—

The teacher's immediate objectives are abilities to be engendered. These abilities are also potential values for the students. For example, the immediate objective of a teacher of typewriting may be described as the "ability to type relatively simple prose at the rate of — words per minute with a maximum of — errors per hundred words." The students may consider this ability a value, that is, they may want to acquire it.

The appreciation of an immediate objective in the form of "an ability to be acquired" may result from the recognition of it as a means of controlling some active value. For example, in the case of typewriting, the appreciation of "ability to type" might be due to the recognition of it as a means of securing a coveted position. In many cases, however, "an ability to be acquired" may become an active value without the student giving any consideration to its practical value. If asked, "Why do you want to learn ——?" he would not be able to give a rational reason. In such cases the appreciation of "abilities to be acquired" is materially influenced by the clearness and definiteness of the teacher's description of the "abilities to be acquired." A definite objective described in terms students can understand is much more likely to be appreciated than an indefinite or general objective.¹

Teachers of typewriting who set definite objectives at the beginning of the term have testified that their students voluntarily practice after school hours and work so dili-

¹Evidence of the appreciation of definite objectives is furnished by the interest students frequently exhibit in standardized tests.

gently that they attain the standards set for them by mid-term. Some teachers of algebra ask each student to keep a graphical record of the quality of his performance on certain assignments. Teachers of other subjects occasionally employ a similar device as a means of motivating the doing of learning exercises. The illustrations of definite objectives given in Chapter III are also illustrations of motivating the doing of learning exercises by setting definite objectives.

A frequent cause for the lack of "driving power" in school work is the failure of the teacher to set definite objectives described in terms that his students can comprehend. Students are not likely to purpose the attainment of indefinite and general objectives. Assignments such as "Study pages — to — carefully"; "Review the lesson assigned for to-day"; "Find out about the expansion of gases" imply abilities to be acquired but they are seldom explicitly recognized by students as objectives to be attained.

In some high-school subjects it is difficult to set definite objectives because the abilities to be acquired cannot be described in definite terms. However, a teacher of foreign languages, history, physics, or even of literature may make an approach to definite objectives. Frequently it will be helpful to ask the class, "What should you learn from studying this topic?"; "What should be your objective?"

It should be noted in this connection that the objectives should be the attainment of certain controls of conduct rather than the doing of certain learning exercises. This point was discussed in Chapter III but it deserves emphasis here. The "ground covered" or the number of learning exercises done is not necessarily important. The change

produced in the student as the result of doing the learning exercises is the important thing. Hence, in setting definite objectives the teacher should express them in terms of *ability to be acquired* rather than in terms of learning exercises to be done.

Assignment of definite exercises to be done assists in motivation.—The above paragraph should not be interpreted to mean that it is undesirable for the teacher to make an explicit assignment of learning exercises to be done. A common complaint of high-school students is that they don't understand what the teacher wants them to do. Although it is probably true that this lack of understanding is frequently due to failure on the student's part to pay attention or to his failure to remember, the teacher must assume the responsibility for making the assignment in such a way that the student will know what he is to do when he begins the preparation of his lesson. An assignment that does not specify definite exercises to be done is a handicap to motivation.

A common fault of assignments, especially of textbook assignments, is that they specify what is to be learned rather than what the student is to do. As we have just pointed out, it is important that the student have a clearly defined objective in terms of abilities to be acquired but it is also important that definite exercises be assigned. Requests to study certain pages of the textbook, to find out about something, to review and the like, leave to the student the task of devising the exercises to be done. Such assignments may be appropriate for advanced undergraduate students in college or in the graduate school but they cannot be defended for high-school students. As a rule they will not be interested in school work unless reasonably definite exercises are assigned.

III. MOTIVATING SCHOOL WORK BY ENGENDERING INTERESTS AND IDEALS

Interests and ideals a source of motive in adult life.—When a person appreciates a value, that is, desires to possess or control it, we say that he is interested in it or that it represents one of his interests. Sometimes the term “ideals” is used to express a similar meaning. In adult life interests and ideals¹ are important sources of motives. An interest in golf furnishes the driving power for periods of practice, for breaking appointments, for defying heat, cold, and rain, and for a number of actions that are characteristic of a golf enthusiast. An interest in music furnishes the driving power for long periods of tedious practice and for enduring hardship, perhaps involving lack of food and clothing. An interest in philanthropy is a driving power, which results in the giving of vast sums of money each year and in the dedication by many men and women of the whole or of portions of their lives to such work. An interest in an invention has “moved” many men to seek knowledge through the study of technical books in our libraries. A housewife’s pride in her home moves her to do tedious and even disagreeable tasks. An ideal of completing a project, once undertaken, frequently furnishes the driving power necessary for persistent effort.

Interests and ideals important school incentives.—It is a part of the teacher’s task to engender certain interests and ideals which are desirable or necessary as controls of conduct in adult life. By fulfilling this phase of his responsibility the teacher also will secure motive for the doing of learning exercises because many of these interests

¹Ideals that fulfill this function are sometimes called “terminal ideals.” See discussion of this point in Chapter X.

and ideals function in school as well as in adult life. When a student likes a subject, he is immediately interested in doing the learning exercises in that field. An ideal of completing a task begun will furnish the driving power necessary to secure the completion of learning exercises begun. An ideal of neatness will motivate the copying of a theme. An ideal of obedience tends to insure performance of tasks assigned by the teacher. An ideal of punctuality will overcome a tendency to procrastinate and the influence of distraction. An ideal of success will often prevent failure to do a learning exercise in which a student has encountered a difficulty.

The technique of engendering interests and ideals.—The technique a teacher should use in engendering interests and ideals will be considered in Chapter X but we may observe here that such controls of conduct cannot be produced by direct procedures such as those employed in the engendering of specific habits, and knowledge. Interests and ideals are not the outcomes of certain definite learning exercises. They are rather by-products resulting from the doing of learning exercises designed to engender specific habits, and knowledge. A student is likely to become interested in a subject if he derives satisfaction either directly or indirectly from doing the assigned exercises. On the other hand, the teacher should not expect a student to be interested in a subject if he derives no satisfaction from doing the assigned exercises. The reason why many students do not learn to like literary masterpieces is that the doing of the exercises assigned in school is annoying rather than satisfying. Perhaps students would not like to read popular fiction if they were required to do the kind of exercises in connection with it that are assigned by many teachers of literature in high school.

A teacher's success in engendering interests and ideals will be somewhat uncertain, and until these controls of conduct have been produced he must utilize more direct means of securing motive. Learning exercises must be done and if the most desirable motives are not operative the teacher must employ substitutes, but he should endeavor to secure the best ones possible.

The effect of the teacher's example.—The teacher's example is an important factor in the engendering of interests and ideals. Hence, he should make evident his appreciation of the values he wishes his students to appreciate. Enthusiasm and interest are "catching." Evidence of this fact is furnished by the way in which an audience responds to a speaker who is interested in his subject. The writer recalls listening to a speaker before a teachers' association whose personal traits were not those that usually please an audience. His language was crude; he gave little evidence of acquaintance with educational principles; he said little or nothing that would be directly helpful to teachers. He, however, did love pictures (which were his topic) and his audience caught something of his enthusiasm. After his time was up they demanded two encores. Think of an audience of teachers at an association demanding encores from a speaker!

The author does not intend to imply that the teacher should attempt to become a professional entertainer. He should not expect to engender the hilarious enthusiasm that is exhibited by the spectators at an athletic contest. He should not feel responsible for holding a miniature pep meeting in order to engender the necessary driving power to get an assignment done. Teachers who do this may create the impression of being unusually effective in motivating their work; but critical observers are likely to

point out that such enthusiasm is only temporary, that the students are not really interested in the learning activities and that they are acquiring a passive attitude toward school work.

The teacher should never forget that he is a "director of learning." It is probably impossible for the teacher to maintain a high pitch of enthusiasm at all times, but he should be interested in his subject and as there is opportunity, he should display this interest. Some teachers are more richly endowed with those traits which go to make up a stimulating personality than others, but any teacher who is interested in his work can find many ways in which to "set an example" for his students.

IV. SECURING MOTIVATION THROUGH EMULATION

Motivation devices based on emulation.—The instinct of emulation, one of the most powerful forces that impel human action, was exploited by the Jesuits as a motive in school work. In their schools the members of a class were paired off so that each student had a competitor. Moreover, competition between groups was encouraged. In more modern times teachers have used many motivation devices in which the appeal was to the instinct of emulation. The old-fashioned spelling match is one such device for securing the driving power necessary for the study of spelling. Even a system of head marks stresses emulation. The interest that students exhibit in grades is due to the instinct of emulation. The awarding of school honors and the forming of honor societies also appeal to it. An appeal to emulation is frequently made in connection with the use of standardized tests by calling the at-

tention of the class to the scores made by other groups or even to the standard scores.¹

Emulation an auxiliary source of motive.—In general motivation devices based on emulation are second- or third-rate teaching procedures. It is much better to secure the necessary motive by creating a need or by engendering interests and ideals but when these methods fail to stimulate the doing of learning exercises sufficiently, the teacher may utilize devices based on emulation. Emulation is a good supplementary or auxiliary source of driving power but its exploitation is to be condemned. It is not satisfactory to have students do assigned exercises only in order to secure high grades or some coveted honor. Under such conditions they may do the exercises satisfactorily but they are not directly interested in the controls of conduct that they acquire. Abilities are considered primarily as means of controlling certain values to which they sustain an artificial relation and hence when the conditions of emulation are not present, the students have no interest in the work.

V. SECURING MOTIVE THROUGH FEAR OF PUNISHMENT OR RIDICULE

Fear of punishment or ridicule formerly emphasized as a basis of motivation.—Until comparatively recent times fear of punishment was frequently employed as the means for motivating school work. Mistakes in the

¹Bagley gives the following incentives as appealing to the instinct of emulation: (1) competitive prizes of intrinsic value, (2) competitive prizes not intrinsically valuable, (3) privileges, (4) immunities, (5) display of pupil's work, (6) grades, marks and promotions. BAGLEY, W. C.—*Classroom Management*. New York: The Macmillan Company, 1907, p. 169.

recitation were rewarded with blows. The writer recalls one Latin instructor who kept a billiard cue handy and an error in either declension or conjugation was rewarded by a vicious poke. Ridicule also has been used as a means of stimulating learning activities. For example, students who failed to know their lessons were ordered to stand in the corner or to wear a dunce cap.

Fear not a satisfactory basis of motive.—It is now generally agreed that seldom if ever is the teacher justified in resorting to fear of punishment or ridicule as a means of motivating the doing of learning exercises. The employment of such a procedure tends to make the students hostile toward the teacher and toward the work of the school. Although it may be temporarily successful, in the long run it will make the teacher's task of motivating school work unnecessarily difficult by engendering attitudes and other patterns of conduct that are incompatible with accepted educational objectives.¹

The discipline of natural consequences.—The reader should not interpret the preceding paragraph to mean that nothing unpleasant should ever happen to a student. Under normal conditions, certain natural consequences² follow from our actions or failure to act. Tardiness results in missing a train; carelessness in driving an automobile lands one in the ditch; failure to read instructions accurately results in wasted effort; neglect of duties in order to engage in recreational activities causes one to lose his job. In adult life recognition of the inevitableness of

¹For a more extended discussion of this point see: BAGLEY, W. C.—*Classroom Management*. New York: The Macmillan Company, 1907, Chapter VIII.

²The "doctrine of natural consequences" was emphasized by Rousseau in his educational treatise, *Emile*, and later by Spencer in his essay, "Moral Education." A brief description is given by BAGLEY, W. C.—*Classroom Management*, p. 106 f.

natural consequences is an important source of driving power, and there is no reason why it should not be employed in school. However, it should be noted that the consequences we are here considering are "natural" not "artificial," i.e., imposed by the teacher or school. Furthermore, a teacher should exercise judgment in calling attention to impending natural consequences. He should make it clear even in such cases as low grades or disqualification for participation in athletic activities that the consequence is a "natural" one.

Sometimes it is wise not to call attention to what will happen. If a student goes ahead pursuing a given course of activity or inactivity and then experiences the consequences, he may "learn a lesson." It may occur to him that a "law of natural consequences" exists. Of course when the consequences will be too severe, it is the teacher's duty to warn the student; but it is not well to attempt to eliminate the consequence, as doing so will create an attitude of dependence rather than independence.

A concluding statement.—The doing of learning exercises may be and frequently is enjoyable, but such activity is seldom entertainment. A student may derive satisfaction from his work but his emotional state will not often if ever approximate that which he exhibits at a football game, a party, or a moving-picture show. Learning is not passive. Learning involves work. Learning exercises made easy lose much of their educative value. Some learning activities will approach drudgery for some students. However, learning exercises must be done if children are to be educated. It is not desirable to "sugar coat" exercises that students do not appear to like. The teacher should maintain the attitude that whatever learning exercises are

necessary for the production of the desired abilities must be done. The elimination or avoidance of any necessary learning exercise should be foreign to his thinking. Such an attitude consistently maintained will have a wholesome effect upon students and contribute much to the fulfillment of his task of stimulating participation in appropriate learning activities.

LEARNING EXERCISES FOR THE READER

[NOTE.—The terms “motivation,” “motivating school work,” and so forth are much used in educational writings. Before beginning your study of the exercises make sure that you understand clearly the meaning of both terms.]

1. After reading this chapter what is your understanding of the phrase “making school work interesting”?

2. Why is it frequently difficult and sometimes impossible for the teacher to create an intrinsic need for the doing of certain learning exercises?

3. Should the doing of a learning exercise be assigned as a punishment? Why?

4. Should grades be used as a means for motivating school work? Why?

5. Give five illustrations to show the distinction between potential and active values.

6. Why does the author insist that the student recognize as his objective the attainment of certain controls of conduct rather than the doing of certain learning exercises? Does it make any difference which type of objective the student recognizes? Why?

7. Select five items of subject-matter from a school subject and show what values they control. Suggest a procedure for securing appreciation of these values.

8. What is the significance of the distinction between “intrinsic needs” and “artificial needs”?

9. Recall from your own experience as a student five effective procedures which your teachers have used in motivating learning activities. Recall five procedures which were not effective.

Can you explain why certain procedures were effective and others were not?

10. Select two topics in some high-school subject and prepare a plan for securing a motive for doing learning exercises relating to each of these topics.

11. What are some of the "natural consequences" which operate in school?

12. Have you ever engaged in a project? If so, how was your central purpose formed?

13. What bearing has the topic of objectives upon motivation?

14. Why do some teachers appear to have no difficulty in motivating the work of their classes while other teachers are able to secure only perfunctory efforts on the part of their students?

15. Explain and illustrate (from your own experience if possible) the statement: "The appreciation of a potential value involves an emotional response."

16. Did you, when a student in high school, take any course in which a teacher set definite objectives and allowed you to work at your own rate in order to attain the standards? Did you work more, or less, diligently in such a course than when only daily assignments were given?

17. As you think over this chapter, what is your opinion of the importance of motivation in comparison with the other duties of a teacher?

18. "To the stream of stimuli which impinge upon his (a child's) consciousness, he responds in ways determined by his instincts and acquired tendencies." Analyze the preceding statement, explaining (defining) the phrases "stream of stimuli," "impinge upon consciousness," "determined by instincts and acquired tendencies." When you are sure you understand the significance of the statement, give examples from your own experience

19. "Enthusiasm and interest are 'catching.'" Probably many times in your school life, you have "caught" enthusiasm for a prescribed task from your teacher. Perhaps some teachers possessed the quality of imparting enthusiasm and interest to such an extent that you did not realize the source of your own interest. Recently I overheard a high-school student remark concern-

ing an English teacher: "Every thing that Miss M. has us do is so interesting." Upon my asking *why*, she hesitated and then replied, "I don't know unless it is that she is always interested too." Think over courses which especially have aroused you to enthusiastic work and decide whether you were greatly influenced by the attitude of your teacher.

20. In the high school which you attended what teaching devices or school customs had as their basis an appeal to the instinct of emulation? Make a list of such devices or customs, and mark with a minus sign those that brought about undesirable objectives on the part of the students, and with a plus sign those that you considered justified.

21. George Herbert Palmer, Professor of Philosophy, at Harvard University, in a delightful monograph entitled "The Ideal Teacher"¹ makes the following statements: "Quite as much for vital transmission as for intellectual elucidation, is a teacher employed"; "Such kindling of interest is the great function of the teacher." Comment on these two statements in the light of the discussion in Chapter IV.

¹Boston: Houghton Mifflin Company, 1910, p. 22.

CHAPTER V

DIRECTING THE FORMATION OF SPECIFIC HABITS: MOTOR SKILLS AND FIXED ASSOCIATIONS¹

The conditions under which students engage in learning activities are commonly designated as recitation or class period, laboratory period, study period, and home study. In the case of the first two, the activity occurs in the presence of the teacher. In some high schools periods are provided for study under the immediate direction of the teacher,² and in most high schools students are expected to do some studying at home. Since most of the teacher's stimulation and direction of learning must occur during the recitation or laboratory period, Chapters V to X will deal largely with the techniques to be employed during these periods. However, the teacher is responsible for stimulating and directing learning at home and in the study room as well as in the classroom or laboratory. A more specific treatment of the directing of learning outside of the recitation period is given in Chapter XIII.

The general organization of Chapters V to X.—Chapters V to X are devoted primarily to the consideration of the procedures a teacher may employ in directing stu-

¹In writing this chapter considerable use has been made of REAGAN, G. W.—“Principles Relating to the Engendering of Specific Habits.” Bureau of Educational Research Circular No. 36, University of Illinois Bulletin, Vol. 23, No. 5. Urbana: University of Illinois, October, 1925, 23 pp.

²See Chapter XIII.

dents in learning activities. The general organization of these chapters is suggested by the recommended classification of objectives. (See p. 60.) Chapter V deals with the direction of those learning activities that lead to the acquisition of specific habits. In Chapters VI, VII, VIII, and IX we will consider the direction of experiencing, generalizing experience, tracing the thinking of others, comprehending the products of thought, using knowledge in solving problems, and organizing and expressing knowledge. Chapter X deals with the direction of the acquisition of general patterns of conduct.

Although illustrations from particular subjects will be used, Chapters V to X do not constitute a group of treatises on special methods. Most high-school subjects involve several types of learning activities and the reader should think of subsequent special method courses as opportunities for the application of the principles of general methods to particular school subjects.

The problems of Chapter V.—The discussion of Chapter V will center about the following questions:¹

1. What kinds of learning exercises should be assigned when the immediate objectives are specific habits?
2. What techniques should be employed in stimulating the doing of the exercises assigned?
3. What procedures should the teacher employ in directing the students in doing the exercises assigned?

Since the general topic of learning exercises was treated in Chapter II and motivation was considered in Chapter IV, most of the space will be devoted to the third question.

¹The discussion here is primarily concerned with the engendering of the specific habits listed under the objectives of school subjects. The engendering of the specific habits relating to classroom routine will be taken up in Chapter XI.

These questions suggest an analysis of the teacher's task (See p. 6.) but the reader should bear in mind that teaching is a unitary process and that the teacher does not complete one phase of his task before he enters upon another. The several phases overlap in both time and procedure, and the success of the teacher's efforts in one phase frequently depends upon what he does in another. Thus, the procedures employed in directing learning will effect the motivation of students; the direction required depends upon the strength of the driving power secured in motivating the work; and both depend upon the learning exercises assigned. Furthermore, the performances of the different phases of the teacher's task are intermingled. For example, it is frequently necessary to continue the stimulation of learning after the directing has been begun.

Nature of specific habits.¹—The distinguishing characteristic of specific habits is the automatic nature of the response that is made to particular stimuli (questions, requests, and practical situations). One who has acquired the group of specific habits included in handwriting, automatically (that is fluently and with little conscious direction) moves the point of his pen so as to form the letters of the words he is using to express his ideas. Even the spelling of the words proceeds automatically until a new or confusing word is encountered. The manipulation of the keys of a typewriter by a competent typist is largely automatic. Attention is, of course, focused upon the general task, but there is little if any consciousness of the individual muscular movements required in striking the appropriate keys. In performing arithmetical calculations, a well-trained person automatically associates the correct results with the figures as they are recognized. For example,

¹This topic was considered briefly on page 30.

in beginning the multiplication 847 by 69 the product 63 automatically comes into the mind of the person making the calculation. The figure 3 is automatically written, 6 being remembered to be carried; the product 36 is given for 9×4 , 6 is added to it giving 42 , the 2 being written and the 4 carried. This procedure is continued until the multiplication is completed. At no point will a competent person find it necessary to stop for the purpose of deciding what a product is, or hesitate in writing the correct figure in the proper position. Other illustrations of specific habits are afforded by athletics, music, foreign languages, algebra, and other high-school subjects.

Some specific habits are simple; that is, they involve a relatively simple response such as giving the product 6×7 , acknowledging a greeting from a friend, or giving the signal for a left-hand turn when driving an automobile. Other specific habits are more complex; that is, they involve a connected series of responses. Illustrations of such habits are found in gymnastic exercises, dancing, driving a golf ball, and pronouncing words of several syllables. However, regardless of the degree of complexity which they possess, the distinguishing characteristic of specific habits is the automatic character of the response to a given stimulus.

Specific habits distinguished from general habits.—The qualifying adjective “specific” is used to prevent possible confusion of the habits considered here with general patterns of conduct, commonly designated by such terms as: “Habit of taking daily exercise,” “habit of walking rapidly,” “habit of being punctual,” “habit of accuracy,” and so forth. A specific habit differs from such controls of conduct in being a definite response to a certain stimulus. A general habit, such as the “habit of neatness,” is a

mode or pattern of conduct applicable to a number of stimuli.¹

Two types of specific habits.—As indicated in the chapter title, specific habits may be divided into “motor skills” and “fixed associations.” This analysis will be helpful in certain portions of the following discussion. Motor skills, such as those required for operating a typewriter, dancing, and so forth, involve the coördination of muscular movements which makes the early phases of the learning process somewhat different from that of forming fixed associations or memorizing,² but it has seemed desirable to treat these two types of specific habits in the same chapter.

Specific habits as explicit objectives.—Some writers on methods of teaching have insisted that “in real life, the multiplication tables, the construction of sentences, the spelling of words, and the like, are incidental to the work of the bank clerk, the manufacturer, the laborer”³ and hence that such specific habits should be taught incidentally; that is, students should not be asked to do learning exercises whose primary function is to engender specific habits. The following statement by Merriam expresses this point of view clearly: “The best way to teach arithmetic is not to teach arithmetic as such, but to teach experiences in which arithmetical operations function.” Although advocates of incidental teaching have demonstrated that certain “specific habits” can be taught incidentally and some scientific investigations⁴ have been

¹The engendering of general patterns of conduct is considered in Chapter X.

²This point is treated more fully on page 127 f.

³MERRIAM, JUNIUS L.—*Child Life and the Curriculum*. Yonkers: World Book Company, 1920, p. 437.

⁴Several of these investigations have been in the field of spelling, the earliest of which was by CORNMAN, O. P.—*Spelling in the Elementary School*. Boston: Ginn and Company, 1902.

reported which were interpreted as showing that "incidental teaching" is more efficient than "direct teaching," the present consensus of practice is distinctly in favor of the latter procedure. Hence it appears that the best policy for the high-school teacher is to assume that if the acquiring of a habit is treated incidentally, that is, is not made an explicit objective, students are likely to fail to acquire it satisfactorily. In general it is not sufficient for the teacher to have clearly in mind the specific habits to be engendered. He should get his students to make the acquiring of each habit an explicit objective. When students do not know what they are expected to become able to do, or how well they are expected to do it, they will seldom be diligent in their efforts to learn.

Some critics have insisted that too much emphasis has been placed upon drill. In our anxiety lest school work become too formal and mechanical, and in our emphasis upon thinking as a learning activity we are in danger of failing to get our students to acquire essential specific habits. The acquisition of such habits is not destructive to thinking; on the contrary, they often clear the way and furnish the materials for reflective processes. "Habit is a lubricant which reduces the friction of life to a point where progress is possible." In the words of Bryan and Harter,¹ "Automatism is not genius, but it is the hands and feet of genius."

In formulating his objectives the teacher should exercise care to include each specific habit which the learner will have occasion to use. This principle results from the fact that the habits we are considering are specific. A

¹BRYAN, W. L., and HARTER, NOBLE.—"Studies on the Telegraphic Language. The Acquisition of a Hierarchy of Habits," *Psychological Review*, 6:344-75, July, 1899.

slight change in the conditions of use may render a given specific habit wholly or partially ineffective. Ability to spell a word orally when the attention is focused upon the act of spelling does not guarantee that the word will be spelled correctly in writing a letter when the attention is likely to be centered upon the expression of the thought. Investigation in the field of arithmetic has shown that $8 + 6$, $6 + 8$, $18 + 6$, and $28 + 6$ require four specific habits instead of a single one. The student may know the English equivalent of a foreign word but be unable to give the foreign word when the English is presented, or he may know a series of facts in one order but be unable to give them in another order. The person who knows the alphabet from A to Z cannot, unless he has given it particular attention, repeat it from Z to A, at least with anything like equal speed and accuracy. Hence, if it is desired that the learner know a serial response in different orders, he must be given an opportunity to learn it in these orders. If, as in the case of arithmetical combinations or inflected forms in a foreign language, it is desirable to be able to use any fixed association of a related group with speed and accuracy, drill must be given upon them out of their logical setting in the group.

Specific habits engendered as needed.—In general, a teacher should not ask his students to acquire a habit until near the time when they will have occasion to use it. This rule is justified by experimental evidence which shows that specific habits atrophy very rapidly if not used. For example, most persons forget very rapidly a poem, formula, or telephone number which they have memorized, if they have no occasion to use the associations formed.

When a group of related specific habits are to be engendered, the teacher should assign learning exercises de-

signed to lead to their acquisition in a psychological rather than in a logical order. When studying a foreign language in a logical order a student would first acquire a considerable vocabulary, then learn the necessary grammatical inflections and rules, and finally undertake the reading of the language. According to the psychological order, the student would begin with the reading of the language and learn the grammar and vocabulary as needed. A strict psychological order may not always be the most efficient, but the teacher should organize his instruction according to it rather than to the logical order.

Superfluous habits should be avoided.—The teacher should avoid engendering superfluous habits, and when acquired they should be eliminated as soon as possible. A very common violation of this principle is the practice of some children who count on their fingers when adding a column of figures. This procedure slows up a pupil's mental processes and is a distinct handicap in arithmetic calculations. In typewriting the learner may make the error of lifting his fingers too high above the keys, and as a result an appreciable amount of time and energy is wasted in operating the machine. A beginning piano student may form the undesirable habit of looking at his fingers while playing.

Specific habits to be engendered in the high school.—The engendering of specific habits in reading, arithmetic, handwriting, spelling, and language is an important function of the elementary school. By the time a child completes the sixth grade he is expected to have acquired an extensive equipment of specific habits in these fields which he will use as tools in his future learning. However, the engendering of specific habits (motor skills and fixed associations) continues throughout the period of his high-

school education. There are some specific habits to be engendered in practically all of the high-school subjects, but they are most prominent in shop work, cooking, sewing, stenography, typewriting, foreign languages, and mathematics. There are relatively few specific habits in history, civics, economics, and literature. When judged with respect to this criterion, general science, biology, physics, and chemistry occupy middle positions.

Specific habits included in the objectives of chemistry.

—As an illustration a number of the specific habits to be learned in the study of chemistry are listed.¹

MOTOR SKILLS

1. The ability to cut and break glass tubing into length desired.
2. The ability to fire-polish glass tubing; in other words, to round the sharp edges in the Bunsen flame.
3. The ability to insert glass tubing into the holes in cork and rubber stoppers, and into rubber tubing.
4. The ability to bore holes in cork and rubber stoppers.
5. The ability to adjust the Bunsen flame.
6. The ability to heat substances in glassware over an open flame.
7. The ability to make apparatus gas tight.
8. The ability to pour chemicals properly.
9. The ability to mix chemicals properly.
10. The ability to fit filter paper to the funnel.
11. The ability to filter properly.
12. The ability to hold the stopper of a reagent bottle while procuring the reagent, to prevent contamination.
13. The ability to measure liquids with the graduated cylinder.
14. The ability to weigh substances accurately on the analytical balance.
15. The ability to bend glass tubing at right angles without forming a weakening construction.

¹These are quoted from ENGELHARDT, MAX D.—“The Objectives of High School Chemistry,” A Master’s Thesis, University of Illinois, 1926.

16. The abilities necessary to read such instruments as thermometers, barometers, and burettes.
17. The abilities necessary to estimate quantities of materials with the eye.
18. The abilities necessary to set up, and make fine adjustments of chemical apparatus.
19. The abilities necessary to clean apparatus.
20. The abilities necessary to use the eye in the observation of chemical phenomena.

FIXED ASSOCIATIONS

1. The abilities necessary to give the symbols of the common elements.
2. The abilities necessary to give the names of common elements when presented with their symbols.
3. The abilities necessary to give the formulas of common compounds.
4. The abilities necessary to give the names of common compounds when presented with their formulas.
5. The abilities necessary to give the valence of the more important elements.
6. The abilities necessary to state the following laws, hypotheses, and theories:
 - (a) Law of conservation of mass.
 - (b) Law of definite composition.
 - (c) Dalton's theory.
 - (d) Boyle's law.
 - (e) Charles' law.
 - (f) Gay-Lussac's law.
 - (g) Avagadro's hypothesis.
 - (h) The principle of van't Hoff.¹
7. The abilities necessary to recognize acids from their formulas (H-).
8. The abilities necessary to recognize bases from their formulas (-OH).

¹This list of laws, hypotheses, and theories is based on "The Minimum Essentials of High School Chemistry," of the American Chemical Society.

9. The abilities necessary to recognize salts from their formulas (neither H- nor -OH).
10. The abilities necessary to recognize the meanings of prefixes and endings in chemical compounds.
11. The abilities necessary to state the meanings of such words as atom, molecule, compound, mixture, oxide, oxidation, inert, electron, catalyst, combustion, reduction, density, standard conditions, absolute temperature, kinetic, solvent, solute, solution, distillation, symbol, formula, decomposition, analysis, synthesis, acid, base, salt, gram, molecule, saturation, osmosis, crystalline, amorphous, ionization, dissociation, allotropic, efflorescent, deliquescent, anhydride, filtration, precipitation, hydrolysis, evaporation, and sublimation.¹
12. The abilities necessary to write important chemical equations.

The general procedure of habit formation.—The procedure by which specific habits are formed is the most direct and definite of the various learning processes. Authors agree closely in their descriptions of it, the variations in statements being primarily for the purposes of directing attention to different phases of the process. Bagley has described it in the following terms:

Focalization of consciousness upon the process to be automatized, plus attentive repetition of this process, permitting no exceptions until automatism results.²

Thorndike describes the general process of learning in terms of the *law of association*.

The likelihood that any mental state or act will occur in response to any situation is in proportion to the frequency, re-

¹This list of representative words is based on BLACK and CONANT.—*Practical Chemistry*. New York: The Macmillan Company, 1920, 475 pp.

²BAGLEY, W. C.—*Classroom Management*. New York: The Macmillan Company, 1907, p. 16. This statement is very similar to the formulations made by James and other psychologists.

gency, intensity, and resulting satisfaction of its connection with that situation or some part of it and with the total frame of mind in which the situation is felt.¹

Rowe points out that "the methods by which an idea is learned and a habit gained are distinctly different" and then states, "multiplicity of association is the basis for one (idea), and invariability in the path of repetition the basis for the other."²

These descriptions of the procedure of habit formation suggest the following aspects for separate consideration:

Initial phases: a correct start and attention focused upon the response to be habituated.

Practice or drill: repetitions of the response which are attentive, correct, satisfying to the learner,³ and sufficient in number to make the habit automatic.

Two types of learning exercises.—When considered with reference to their function, learning exercises for the engendering of specific habits fall into two groups: (1) those designed to give the learner a "correct start," and (2) those designed to provide the necessary repetitions.

The first group of learning exercises is especially important in engendering motor skills. A "correct start" does not mean that the learner performs the act perfectly, but rather that he has grasped the idea of the movements to be made. Perfection in the performing of the act is attained

¹THORNDIKE, E. L.—*The Elements of Psychology*. New York: A. G. Seiler, 1905, 1907, p. 207. Compare with the laws of learning on pages 38-9.

²ROWE, STUART H.—*Habit Formation, and the Science of Teaching*. New York: Longmans, Green and Company, 1909, p. 37.

³This condition is implied in the third law of learning stated on pages 38. The learner's satisfaction is frequently derived largely from a knowledge of his progress.

through practice in which "trial and accidental success"¹ play an important part. In acquiring fixed associations, which are commonly called "memorized" facts or statements, the learner is able to make the correct response from the beginning.

Learning exercises to give the learner a correct start in acquiring motor skills.—The most generally applicable procedure for giving a learner a correct start in acquiring motor skills is a demonstration by the teacher of the act to be performed, supplemented by an explanation. In case the act is complex, that is, composed of a series of coördinated movements, the instructor should perform it slowly. Slow motion pictures illustrate the value of this procedure. Another type of learning exercise, which may be used in giving the learner a correct start in acquiring a complex act, is to break it up into several separate movements that are later combined. For example, in giving a swimming lesson the teacher may demonstrate the different movements and direct the learners to practice first the movements of the arms and later those of the legs before attempting to combine them. A similar procedure frequently is followed in teaching the swinging of Indian clubs.

An explanation supplementing the demonstration often is helpful also. Parker² gives an illustration from his own experience in learning to do the "kip" or "snap-up" on the horizontal bar. Under one instructor he failed entirely to acquire the habits necessary to perform the act. Later,

¹This expression is used in preference to "trial and error." However, the word "accidental" should not be interpreted to mean that the trials are "blind" or not consciously directed. A more explicit expression would be, "trial with an effort to improve plus observation of successes and errors."

²PARKER, S. C.—*Methods of Teaching in High Schools, Revised Edition*. Boston: Ginn and Company, 1920, pp. 109-10.

another instructor explained the motions to be made and gave suggestions for correcting the errors that he noticed. As the result of this instructional technique Parker made a correct start and quickly learned to perform this act. In this illustration of teaching a motor habit two procedures were employed. *First*, the movements to be made and their sequence were explained. *Second*, as the learner tried to perform the kip the instructor suggested modifications of the movements. The second procedure is very important.

The learner has made a beginning when he tries to make the movements¹ even though his performance be far from correct. It is, however, important for the instructor to correct the errors at once. In doing this he may place the learner's hands or feet in proper position or even actually move members of his body so that the desired motions will be made. For example, in teaching a stroke in golf, the instructor may "give" the learner the idea of the movements to be made by moving his arms and body through the correct swing.

Sometimes pictures or diagrams may be used advantageously in giving students an understanding of the act they are to perform. In employing a diagram or in giving an explanation of a performance, the teacher should direct the attention of the learner to the vital points, particularly those which are likely to be overlooked. Sometimes, especially after a teacher has demonstrated the movements to be performed, he may direct the learners to practise before a mirror until their movements look like his.

¹Rowe states, "The last, and perhaps most important, rule from the standpoint of even preliminary demonstration is: Get the pupil to attempt the act." ROWE, STUART H.—*Habit Formation and the Science of Teaching*. New York: Longmans, Green and Company, 1909, p. 116.

In most cases of motor skills there are certain "better methods" and the teacher should choose his learning exercises for giving students a correct start so that they will conform to one of these "better methods" from the beginning. It should, however, be noted that for many, if not all, cases of motor skill there is no single "best method." In penmanship, for example, there is no one best position for each part of the hand in the case of all children since some variations in position may be necessary on account of differences in the structure of their hands. As we have previously pointed out, children differ, and teachers should not expect absolute uniformity in the method of performing a motor act.

In connection with the exercises assigned, the teacher may direct the student's attention to movements to be made or to the result of the movements. In many cases the latter procedure is more effective. The validity of this principle is illustrated in learning to toss balls, to pronounce difficult words, particularly those of a foreign language, or to produce certain tones in singing. When it appears desirable to have the learner observe the movements, his attention should be directed to those to be performed rather than to those to be avoided. An illustration of a learner focusing his attention upon the wrong thing is furnished by the familiar example of an inexperienced bicyclist who fixes his eyes upon a stone or tree with the determination to steer clear of it. The result is usually a collision with the object he endeavored to avoid. The reason for this is that the movement which predominated in consciousness is most likely to be performed.

Learning exercises to give the learner a correct start in forming fixed associations.—A "correct start" has a somewhat different meaning when applied to memorizing facts,

statements, or the vocabulary of a foreign language. In such cases it may be interpreted as meaning that the learner should comprehend the meaning of the words or other symbols before he begins his practice. Meaningful material is more easily memorized than words, phrases, and other symbols which are not understood.¹

In teaching the vocabulary of a foreign language some teachers use learning exercises designed to lead to a direct connection between the foreign symbol and its meaning. For example, the teacher shows the class an object such as a pencil, book, or picture, and utters the foreign language name for it requesting the students to repeat it. If this start is followed by sufficient repetitions, the students will form a fixed association between the visual apprehension of the object and the foreign language name similar to that which they already associate between it and its English name. The meaning of action verbs can be taught in a similar way.

The indirect teaching of a foreign language vocabulary involves the use of a different learning exercise. This method assumes a connection already established between the meaning and the English word or phrase and exercises are devised to build up a connection between the English symbol and the foreign language symbol. Hence the connection between the meaning and the foreign language symbol is indirect, that is through the English symbol.²

¹For a discussion of the distinction between fixed associations and knowledge see p. 157 f.

²For a more extended discussion of the direct and indirect methods of teaching the vocabulary of a foreign language, see: PARKER, S. C.—*Methods of Teaching in High Schools, Revised Edition*. Boston: Ginn and Company, 1920, Chapter VII. One who is interested in the teaching of a foreign language will find it helpful to consult MORRISON, HENRY C.—*The Practice of Teaching in the Secondary School*. Chicago: University of Chicago Press, 1926, Chapter XXV.

Learning exercises for making responses automatic.—

After the learner has made a satisfactory start, it is necessary for the teacher to provide exercises for a sufficient number of attentive repetitions. In devising and assigning these learning exercises the teacher should recognize the following principles:

I. The learning exercises should provide for repetitions under conditions approximating those which will attend the use of the habit. The complete observance of this principle is represented by "practice through application." For example, practice in factoring may be given through solving quadratic equations by the method of factoring; practice on a vocabulary of a foreign language by translating appropriate passages; practice in tackling through playing a game of football, and so forth. Although "practice through application" affords repetitions, it is frequently necessary to single out a specific habit for isolated practice in order to secure focalization of attention upon the particular motor act or mental association and to increase the number of repetitions. For example, in training a football team, the coach usually requires such learning activities as "practice in tackling," "running signals," "falling on the ball," and so forth. In music, special exercises are frequently assigned. However, in devising exercises for "isolated practice," the teacher should endeavor to approximate the conditions under which the specific habit will be used.

II. In the case of a group or series of specific habits the teacher should be careful to provide exercises for practice on each item of the group. The validity of this principle rests upon the fact that in the case of specific habits, the ability to make one of a series of responses is no guarantee that another of the series can be made with equal facility.

For example, the ability to spell one word does not insure an equal ability to spell any other word; ability to respond to $8 + 5$ is not evidence of equal ability to respond to $5 + 8$, $18 + 5$, and $28 + 5$; ability to strike correctly a certain sequence of keys on the typewriter does not insure equal proficiency in typing other sequences.

III. The number of exercises assigned should vary directly with the difficulty of the response. This principle requires no justification. Most teachers are aware of its importance and doubtless endeavor to observe it in devising exercises for drill. However, a teacher may violate it more often than he realizes. Analyses of drill material provided by arithmetic texts have revealed that the number of repetitions provided is not at all in agreement with the difficulty of the habits to be acquired.

IV. The teacher should provide for the proper distribution of practice. Two elements are involved in distributing practice: the length of the intervals between successive practices and the amount of time devoted to each practice. The teacher is confronted therefore by such questions as these: In order that learning may proceed most economically and effectively, should drill be given daily, or on alternate days, or weekly, or how often? Should the intervals between practices be uniform or should they vary in length? How long should the drill period be—ten minutes, or twenty minutes, or forty minutes, or some other length? Should the length of period be constant or should it vary with the degree of habituation that has been reached?

In answering these questions it must be remembered that students, as well as the learning exercises, differ. The most effective distribution of practice for the primary-grade pupil in learning the addition combinations and for the high-school student in learning a Latin conjugation

may be quite different. Furthermore, the distribution that is most economical for a particular student when he is mastering factoring in algebra may not be best for him when he is acquiring skill in shorthand or in sawing a board. It is probable, however, that the following suggestions will hold true in most cases.

(a.) If the learning task is relatively short and easy, the first learning may be most economically achieved by massed rather than by distributed effort. For example, if one is memorizing a short poem which he can learn to the point of immediate errorless reproduction in a quarter of an hour, he will save time by learning it at one sitting rather than by distributing the initial learning over several periods of two or three minutes each. It should be said, however, that a greater number of later repetitions will be needed for permanent retention if the first learning proceeds by the former plan.

(b.) If the learning task is long or difficult, distributed effort will save time and energy. Thus, if 200 lines of poetry are to be learned, it is advisable to devote a little time, say ten or fifteen minutes, each day to the task until it is completed rather than to attempt to learn the entire 200 lines at one time.

(c.) In the early stages of habituation of mental responses, frequent—perhaps daily—practices are desirable. As the approach to automatic response proceeds, the intervals between practices may be gradually lengthened until further drill is unnecessary. In automatizing motor responses it seems that daily practices are not always economical even in the early stages of learning.

(d.) It is usually held that relative short practice periods result in the best returns for a given expenditure of time. The proper length of period depends upon several factors,

among which are (1) the maturity of the learner, (2) the nature of the learning activity, and (3) the degree of habituation to be attained. In general, the student may profitably continue practice at one time as long as he shows a high degree of efficiency, or in other words until fatigue effects begin to appear.

V. The teacher should provide exercises for continuing the learning to the required degree of efficiency. The learning must not be stopped at too low a level of habituation. Underlearning is always unsatisfactory learning, and "unless the process reaches the stage of automatism, all of the initial repetitions represent time and energy practically thrown away."¹ Hence, learning of specific habits should be carried to the proper level, and occasional repetitions should be provided later to guarantee that this level is retained. In habit formation it is eminently true that whatever is worth doing at all is worth doing well.²

VI. When students are asked to learn names, dates, or other facts or statements which are not naturally associated it is sometimes appropriate for the teacher to suggest mnemonic devices, which are highly artificial aids to memory. These may also be used when the existing associations are not sufficiently strong to offer an effective basis for recall.

¹BAGLEY, W. C.—*Classroom Management*. New York: The Macmillan Company, 1907, p. 18.

²We do not have any formula for determining the number of repetitions required for attaining a specified degree of skill. The outcome of practice is affected by several factors. The degree of attention the learner gives to the repetitions, the degree of satisfaction he derives from it, the degree of facilitation afforded by the learning of related habits, the difficulty of the habit, and the capacity (intelligence) of the learner affects the outcome of practice as well as the number of repetitions required to engender a specified degree of proficiency. For an estimate of the number of repetitions required in learning the addition combinations in arithmetic, see: THORNDIKE, E. L.—*The Psychology of Arithmetic*. New York: The Macmillan Company, 1922, p. 133.

Systems of so-called memory training have been constructed upon the basis of mnemonic devices. The value of such devices is limited since the associations they establish are mechanical and meaningless. However, a mnemonic device occasionally may be useful. The otherwise meaningless word *vibgyor* serves to suggest the names of the spectral colors (violet, indigo, blue, green, yellow, orange, red) into which sunlight is decomposed by a prism and also the order in which they appear on the screen after the dispersion. In music, f-a-c-e aids in recalling the letter-names of the spaces of the staff. The order in which members of the cabinet succeed to the presidency is easily remembered by calling to mind the fictitious St. Wapniael.

Learning through trial and accidental success.—The higher levels of skill in performing motor acts such as tossing balls, playing golf, operating a typewriter, playing a musical instrument, or dancing are attained only through long periods of practice in which trial and accidental success¹ play an important part. It is, however, necessary that the learner be aware of his errors, “experiment” by introducing variations, note the satisfying responses, commonly described as “accidental successes,” and endeavor to habituate the movements that produce them. In this way some persons without “taking lessons,” attain considerable proficiency in motor acts.

In the absence of direction the learner is likely to try methods which cannot produce satisfactory results. The teacher can usually shorten the period of learning through trial and accidental success by suggesting variations in the method of performance. In making these suggestions, the teacher should avoid discouraging the learner's initiative and interest in improving.

¹See footnote on page 127.

Motivating the doing of exercises.—Motivating the doing of exercises designed to lead to the acquisition of specific habits is relatively easy. The abilities classified under this rubric are more tangible than either knowledge or general patterns of conduct. This quality of specific habits makes needs for them more clearly defined. For example, a girl who desires to secure employment as a stenographer knows that she needs to acquire the specific habits included in stenography and typewriting; the boy who desires to speak a foreign language has a reasonably clear idea of the immediate objectives he must attain. Since a clearly defined need is more effective as a basis of motive than an indefinite one, it follows that securing a motive by creating a need is easier in the case of specific habits than when other types of abilities are to be engendered.¹

When specific habits are to be acquired, the objectives to be attained can usually be described in definite terms and frequently students may be acquainted with their progress in learning. It was pointed out in Chapter IV that these conditions are distinct assets in motivating school work. In addition, learning exercises for engendering specific habits are usually explicit requests for definite activities. This is especially true of exercises for practice. Although drill is sometimes uninteresting, students frequently like it if the teacher assigns appropriate exercises and carries on the work in a businesslike way. Some of the most enthusiastic class work the writer has observed has been in algebra.

However, the teacher should bear in mind that a strong

¹A need for additional practice or for different practice is frequently created by calling the learner's attention to errors in his practice. This point will be developed more fully on page 140f.

motive is important in learning specific habits. The repetitions must be attentive if they are to be effective. Perfunctory practice is little better than no practice. The truth of this principle is fully realized by athletic coaches and they insist that the members of the squad exhibit "pep" and enthusiasm in practice.

The discussion of the preceding paragraphs furnishes a basis for stating some rather definite rules or principles for motivating the doing of exercises designed to lead to specific habits.

I. The teacher should endeavor to make clear to the student the particular specific habits he is asked to acquire and should specify the level of accomplishment he is expected to attain.¹ For example, in typewriting a definite goal should be set in terms of rate and accuracy; in algebra the goal for the topic of quadratic equations may be described in terms of kind and number of exercises to be done correctly in ten minutes; in translation of a foreign language the goal may be described in terms of the rate and accuracy of reading certain paragraphs

II. The setting of definite goals to be reached should be supplemented by some means of informing the learner at appropriate intervals in regard to his progress, because knowledge of one's progress is a very effective incentive. If the student's progress is satisfactory, the feeling of satisfaction spurs him on to further effort;² if unsatisfac-

¹In addition to the desirability of setting definite objectives as a means of motivating practice, they are essential for economy. The waste attending under-learning has already been noted. (See page 65.) Over-learning is also wasteful because high degrees of skill are seldom needed by the average person. For example, few persons need to be expert penmen, expert calculators, expert mechanics, or expert linguists.

²Thorndike attaches great importance to the effect of the satisfaction or dissatisfaction that the student experiences. See the statement of the laws of learning, page 38.

tory he becomes conscious of his shortcomings and will usually strive to beat his record, a most desirable form of emulation. Judicious praise also stimulates the learner. When commendation is deserved the teacher may say, "That's fine." "You are getting it." "That's right." Sometimes he may ask a learner who is succeeding to show the class. However, commendation must not be used too freely or it will cease to be effective.

III. Exercises for practice should not be too difficult; but on the other hand, they should be difficult enough to afford a challenge to the learner. Monotony should be avoided by varying the types of learning exercises in so far as compatible with other requirements.¹ Sometimes a change from oral to written drill, or the reverse, will stimulate effort. Exercises that are timed frequently arouse interest.

IV. Work should be started promptly at the beginning of the period for practice, for the wasting of time in assigning exercises for practice is likely to encourage inattention on the part of the class. In many cases it is advisable to have exercises mimeographed or printed. Expenditures for this purpose are frequently very profitable investments. For some topics ready-made practice materials may be purchased.

The general nature of the direction of learning.—Assuming that appropriate exercises have been assigned and that the students are attempting to do them, what may the teacher do to make their efforts as effective as possible? The directive procedures employed by teachers may be grouped under three heads: (1) Suggestions and rules for

¹"The desire for change and variety is instinctive in all human beings irrespective of age or degree of culture." BAGLEY, W. C.—*Classroom Management*. New York: The Macmillan Company, 1907, p. 147.

study, (2) diagnosis and remedial instruction, and (3) direct assistance.

The first group of procedures has been emphasized by many writers on methods of teaching, especially in connection with the topic of supervised study.¹ In some high schools students are furnished with a mimeographed or printed list of directions for study.

The function of general rules for practice.—Practice is essential in acquiring specific habits, but any kind of repetition is not necessarily effective. Some guidance of practice is afforded by the types of learning exercises assigned. Additional guidance may be given in the form of general rules which prescribe certain phases of the performance of these exercises. General instructions relating to practice are especially important when the learner is expected to engage in repetitions which are not under the immediate supervision of the teacher.

A suggested list of rules for students.—Several general rules, which should guide practice, have been mentioned in the preceding pages. To these, other general rules have been added in the list given here.

1. Practice with a determination to learn. Watch for errors and try to correct them.
2. When it is feasible, keep a record of your learning and endeavor to improve it.
3. In practicing a motor habit focus your attention upon the results to be produced, rather than upon the separate movements to be made.²

¹HALL-QUEST, A. L.—*Supervised Study in the Elementary School*. New York: The Macmillan Company, 1924, pp. 63-73. Also *Supervised Study*. New York: The Macmillan Company, 1916, p. 116 f. WHIPPLE, G. M.—*How to Study Effectively*. Bloomington, Illinois: Public School Publishing Company, 1916, 44 pp.

²This rule is appropriate to many but not all cases of acquiring motor habits.

4. Memorize by wholes rather than by parts.¹
5. Practice recall in memorizing when you have learned the material well enough so that a correct response can be given.²
6. In memorizing facts and other material consisting of items not explicitly connected, seek to establish associations between the elements of the material being learned.
7. As far as possible avoid making incorrect responses during practice.
8. Practice most upon those responses that appear to afford the greatest difficulty.

Errors not tolerated in practice.—The first principle to bear in mind in evaluating practice is that errors must not be tolerated.³ Failure to respond correctly in practice marks the loss of a repetition, but, more important, it tends to destroy or counteract the formation of the desired habit. When an error is made it tends to be repeated unless its occurrence is annoying. Very soon it is a habit and when the player attempts to correct it, he has a double task,

¹This principle is generally advocated by authorities on methods of teaching, but it can hardly be said to have been established beyond question for all learners or for all types of learning. It probably holds for most learners in memorizing meaningful material, especially after it is comprehended.

²By recall is meant the repetition of the material without reference to the text. If a poem is being memorized as a whole, after a few repetitions there will be portions which have been learned to the point of perfect reproduction. When the learner, in the course of later repetitions, comes to these portions, he should exercise recall, enlarging these parts and adding others as soon as possible. Recall should not be attempted too soon, i. e., before it can be done correctly. Here, as elsewhere, repeating an error strengthens it.

³In describing the process of habit formation, it is frequently stated that "no exceptions are to be permitted until the habit is fixed." See page 125. Since exceptions, i. e., errors, will occur during the process of learning, the statement should be interpreted to mean that no exceptions are to be tolerated.

first to break the habit already formed, and second to form a new habit.

In acquiring motor skills students will make errors but the teacher should be diligent in detecting mistakes and then directing the learner's attention to them. The student cannot reasonably be expected to correct errors of which he is unaware. It has already been pointed out that repetition of errors tends to strengthen them. It is futile to hope that, as if by magic, they will disappear if only they are repeated often enough. Yet this is essentially the case when a teacher allows practice to continue without making clear to his students wherein improvement is needed.

In evaluating the performances of students acquiring fixed associations, the teacher should insist upon absolute accuracy during the period of practice. The teacher should evaluate such specific habits, as ability in typewriting, stenography, or ability to read a foreign language orally with respect to the rate of performance as well as to the accuracy. However, accuracy should never be sacrificed in order to secure a rapid performance.

Successes noted as well as failures.—Although the principal purpose in evaluating the performances of learners is to detect errors and other shortcomings, the teacher should bear in mind that pleasant feelings facilitate progress in learning. Hence, the teacher should not neglect to call the learner's attention to his successes as well as to his failures.

Comprehensiveness in diagnosis.—Many of the specific habits to be acquired occur in groups. For example, in elementary algebra the student is expected to learn a number of fixed associations in the study of the topic of factoring. Another group to be learned relate to the quadratic equations. In shorthand there are many as-

sociations to be automatized. In diagnosing a student's achievement the teacher must be certain that he explores the entire field of the specific habits with which he is concerned. Many diagnoses are imperfect because they are not thorough. Since the habits are specific, a student may acquire certain ones and fail to acquire others in the same group, or closely related groups. It has been shown in arithmetic and in some other school subjects that failure to acquire certain specific habits has not been discovered by teachers; and it is obvious that we should expect such a condition unless the teacher carefully explores the entire field.

Standardized tests as instruments for diagnosis.—In arithmetic and in certain other elementary-school subjects standardized tests¹ are available for making diagnoses of achievement, but relatively few such tests have been constructed for the subjects taught in high schools. However, if the teacher recognizes the principles that have been enumerated here, the lack of standardized tests is not a serious handicap.

The meaning of a "supplementary" learning exercise.—Supplementary learning exercises differ from others only in that they are explicitly designed to correct particular deficiencies in the habits being acquired. Thus, in devising supplementary learning exercises the teacher must proceed as a physician who diagnoses a patient's physical condition and then prescribes exercise, diet, and medicine, which in his judgment will remedy the undesirable conditions discovered.

Interpreting diagnoses in terms of the need for supplementary instruction.—In some cases the general character of the need for supplementary learning exercises is obvious. If a child's performance in solving algebraic equations or

¹Standardized tests are discussed in Chapter XVI.

in the oral reading of a foreign language is satisfactory with respect to accuracy but deficient in rate, exercises designed to increase rate are needed. If the deficiency is in accuracy, a different style of exercise is needed. Errors which are persistent, i. e., not random or accidental, should be singled out for isolated drill. In some cases the student needs to listen to an explanation or to observe a demonstration. Many teachers of spelling require students to keep for special study a list of the words they misspell.

When a fault to be corrected involves the breaking of habit as well as the engendering of the desired control of conduct the teacher's problem is more difficult. Such a situation may occur in pronouncing words and phrases of a foreign language, in performing movements in athletics, in remembering a formula in physics or chemistry, and so forth. As we have pointed out on page 129, in such cases the learner's attention should be focused upon the response to be made rather than upon the one to be avoided. Sometimes a mnemonic device should be suggested to assist the learner in forming the correct association.

Critics of our high schools have pointed out that very few students who have spent two or three years studying a foreign language are able to speak or read it at all satisfactorily, especially after a few months have elapsed. One reason for this condition is that specific habits tend to atrophy when they are not used, but a more significant cause is the failure of the teacher to set satisfactory objectives and to evaluate the abilities of his students with reference to them. The teacher being unaware of the deficiencies of his students, at least in detail, fails to provide sufficient practice. The objectives formulated by Dalman for first-year algebra (see page 67) furnish a definite basis for evaluating the achievements of students and indicate

the nature of the additional practice needed. Several sets of practice tests have been constructed on the same principle; i. e., definite and detailed objectives, evaluation of achievement with reference to these objectives, and additional practice if needed. When the specific habits to be engendered represent permanent achievements or even semi-permanent controls of conduct, the teacher must incorporate this quality in his objectives and then provide whatever practice may be necessary to secure the desired degree of permanency. There is seldom any defense for half-learning in the case of specific habits. Usually what is worth learning is worth learning well, and the wise teacher will be guided by this principle rather than by an objective expressed in terms of ground-to-be-covered.

LEARNING EXERCISES FOR THE READER

1. In your study of Chapter II you were asked to define and illustrate "motor skills," "specific habits," "fixed associations." Review your definitions of these terms.
2. Discuss the nature of specific habits.
3. Make a list of ten specific habits that may be engendered in high school.
4. Explain the statement: "Teaching is a unitary process."
5. Give five illustrations to show the distinction between specific habits and general habits.
6. Give five illustrations to show the distinction between motor skills and fixed associations.
7. Give examples from your own experience of specific habits which were ineffective when called for in a different order from that in which the habit had been formed.
8. William James¹ states three maxims regarding the acquisition of new habits: (1) Take care to launch yourself with as

¹JAMES, WILLIAM.—*Talks to Teachers on Psychology*. New York: Henry Holt and Company, 1900, pp. 68-69.

strong and decided an initiative as possible; (2) Never suffer an exception to occur till the new habit is securely rooted in your life; (3) Seize upon the very first possible opportunity to act on every resolution you make. Compare this description with those given by Bagley and Thorndike (See page 125.), and indicate the agreement that exists between them.

9. Select some high-school subject, preferably one that you expect to teach, and indicate ways in which a teacher of this subject may set definite goals for his students to attain.

10. Select some high-school subject, preferably one that requires many drill exercises, as algebra, rhetoric, or a foreign language, and indicate special devices for motivation which could be used.

11. Under the direction of an instructor, each of you has acquired proficiency in some motor skill such as that required in a gymnastic stunt, playing a piano, riding a bicycle, driving an automobile, speaking a foreign language, swimming, and so forth. Select one activity, recall the "start" you made, and describe the method by which you learned to make the correct movements.

12. Select a motor act which you acquired skill in performing through the trial and accidental success method and describe as best you can your progress by accidental successes.

13. Recall some poem of one hundred lines or more which you memorized in high school. Did you learn it by massed or by distributed effort and did your teacher direct you at all concerning your method of studying? Can you still repeat the poem? In what ways do you now feel that your study of the poem might have been more effective?

14. Define "mnemonic devices" and give illustrations of mnemonic devices that you have found helpful.

15. Eight rules for practice have been suggested in this chapter. Make a note from this list of those that you are accustomed to follow and add other rules that you have found effective in your practice.

16. Define and illustrate the following terms: habituation, recall in memorizing, individual emulation, group emulation, automatism, automatic response, remedial instruction, practice through application, attentive repetitions.

17. By some writers, Thorndike especially, great importance is attached to the effect of pleasant feelings upon progress in learning. Illustrate from your own experience a learning task that was facilitated because of pleasure and satisfaction in the task and one that was unsuccessful because of discomfort or dissatisfaction.

18. Select some high-school subject in which much drill is necessary, as in the vocabulary of a foreign language, and describe devices which a teacher might employ in order to insure not only continued repetitions but attentive repetitions.

19. The following statement is made by Bagley and Keith:¹ "The work of the elementary school fairly bristles with these specific habits." Enumerate ten specific habits that are typical of a large number formed during the elementary school period.

20. William James says in his chapter on "Habit," in *Talks to Teachers on Psychology*, "The more of the details of our daily life we can hand over to the effortless custody of automatism, the more our higher powers of mind will be set free for their own proper work." Compare this quotation with that given from Bryan and Harter, page 120.

¹*An Introduction to Teaching*, p. 213.

CHAPTER VI

DIRECTING THE ACQUIRING OF KNOWLEDGE THROUGH EXPERIENCING AND DEVELOPMENT

The learning activities that produce knowledge.—The controls of conduct designated as knowledge include outcomes resulting from most of the types of learning activities enumerated in Chapter II. "Direct or perceptual experiencing" is basic but under certain conditions "vicarious experiencing" may be substituted. "Generalizing experience" is an essential learning activity, but under certain conditions a "short-cut" is provided by "comprehending the products of thought." A student's knowledge grows as he uses it in "manufacturing responses to new situations." A student also learns by "tracing the thinking of another person," and by "expressing his own ideas."

Although knowledge results from each of these types of learning activity, the reader should not assume that they fulfill identical functions. Perceptual experiencing is necessary but a student cannot acquire an efficient knowledge equipment through experiencing alone. Neither will tracing the thinking of others through listening or reading result in dynamic knowledge. Efficient learning requires some participation in each of the types of learning activity. It is especially important that the student participate in "manufacturing responses to new situations"

and in "expressing his ideas." In devising and selecting learning exercises the teacher should endeavor to secure an appropriate balance between the several types of activity. This principle may be expressed by saying that the learning exercises assigned should constitute a "balanced ration." Over-emphasis of certain types will result in the neglect of others. It is probable that in present school practice "comprehending the products of thought" and "tracing the thinking of other persons" as they occur in reading are over-emphasized, and "using knowledge in responding to new situations" and "expressing ideas, facts, and principles" are neglected.

The problems of Chapters VI, VII, VIII, and IX.—The central problems of these chapters are the following:

1. What kinds of exercises afford an effective basis for the learning activities that produce knowledge?
2. What instructional procedures should the teacher employ in directing the doing of these types of learning exercises?
3. How may the knowledge achievements of students be evaluated?

Since seven types of learning activities are involved it has been advisable to organize the consideration of these problems as follows: Chapter VI, experiencing and development of knowledge by analysis, comparison, association, and generalization; Chapter VII, acquiring knowledge through reading, which includes one form of vicarious experiencing, tracing the thinking of another person, and comprehending the products of thought; Chapter VIII, using knowledge; Chapter IX, organizing and expressing knowledge. The third problem is treated very briefly in Chapter VI and some phases are deferred until Chapters XV and XVI. As

an introduction to the consideration of the directive procedures that teachers should employ, the nature of knowledge as a control of conduct is first discussed. This is necessary because clearly defined immediate objectives are prerequisites for an intelligent consideration of the instructional procedures to be employed.

Knowledge as an adaptive control of conduct.—In Chapter II knowledge was used as a name for the “controls of conduct (abilities) that function in overcoming the difficulties presented by new situations.” When considered with reference to its use or function, this is the distinctive characteristic of knowledge. It differs from specific habits (considered in Chapter V) in being an adaptive rather than a fixed control of conduct.¹ When one has formed a habit he possesses a ready-made response for a certain situation. For example, a typical first-year high-school student is able to respond fluently to a request to multiply 647 by 89, i. e., he possesses ready-made responses for the series of stimuli involved in this exercise. One who has practiced extracting the square root of numbers until the procedure has been habituated, is able to respond “without thinking” to a request to find the square root of 310464. Another person who has not formed the necessary specific habits but who understands the formula $(a+b)^2 = a^2 + (2a+b)b$, would be able to devise a procedure by applying this formula. He, however, cannot respond “without thinking.” The distinction between specific habits and knowledge is illustrated also by the difference between a person who possesses a ready-made answer to a question such as, “How does knowledge differ from specific habits as a control of conduct?” and one to whom the question

¹This point is elaborated by DEWEY, JOHN.—*Democracy and Education*. New York: The Macmillan Company, 1916, p. 395 f.

is new but who is able to manufacture an answer by reflective thinking.¹

A description of the content of knowledge.²—It will be helpful to supplement this functional description of knowledge by considering its psychological characteristics. When a child becomes aware of an object as the result of its stimulation of one or more of his sense organs, he tends to revive “associated” sensations from his past experience. For example, when visiting in the home of a friend a boy sees a small rectangular cabinet or box with dials on one face. He recognizes it as a “radio.” His mental activity may be described by saying that the presence of the object produced certain visual sensations in his mind which were supplemented by revived images of other instruments seen on previous occasions, images of music, announcements and static heard, and perhaps by images of kinaesthetic sensations experienced in the construction of an instrument. In this way the sensory impressions (sensations) are interpreted or given meaning.³ The combination of “sensations immediately evoked by external stimuli” and revived meanings is commonly designated as a *percept*.⁴ The

¹Rowe makes eight distinctions between habits and ideas. Two of the most significant are: “Habit is automatic or self-carrying; ideas are subject to hesitation, obstruction, interruption, and varied suggestion.” “Habit is the product of repetition; ideas may be gained through a single experience.” ROWE, STUART H.—*Habit Formation and the Science of Teaching*. New York: Longmans, Green and Company, 1909, Chapter IV.

²This topic is treated very briefly here. Unless the reader has studied it in educational psychology or some other course, he will find it helpful to read a more extended discussion. A good reference is BAGLEY, W. C.—*The Educative Process*. New York: The Macmillan Company, 1905, Chapters IV to XI, especially IV, VIII and IX.

³The reviving of associated images and the use of them in interpreting the stimulus that produced the sensations is sometimes called *apperception*.

⁴Bagley describes percepts as “*images* (the focal constituents made up primarily of sense-materials) *plus* a ‘halo’ of kinaesthetic and other organic sensations.” The “halo” consists of “revived meanings” and they furnish the *meaning* that is

activity of perceiving, i. e., forming percepts, is what we designated in Chapter II as perceptual experiencing.

A percept revived when the thing or event is not present to the senses is called an *idea*.¹ For example, if a student who has generated hydrogen in the chemical laboratory by placing dilute sulphuric acid on zinc is stimulated to recall this experience by a question or by reading about hydrogen, the revived image forms an *idea* of the generation of hydrogen. Thus we may say that the perceptual experiencing occurring in generating hydrogen produced an idea as an outcome. The essential element of an idea is the meaning which Bagley defines as "the marginal 'halo' of possible 'cues' to conduct." In the illustration just given, this "halo" would be derived largely from the manipulation of the apparatus and the use of the hydrogen generated.

Ideas that result directly from perceptual experiencing are usually designated as "concrete ideas." The more "immediate sensory elements" of the revived percept are relatively vivid and tend to predominate in the mental state, and the idea is connected with a particular thing or event. Experience may be condensed or generalized. Some of this occurs in perceptual experiencing but it is possible to effect much greater condensation. As this occurs the idea becomes abstract, i. e., taken away from particular experiences. The image becomes a sort of composite picture of the experiences condensed.² The "more

attached to the perceived object or event. BAGLEY, W. C.—*Educational Values*. New York: The Macmillan Company, 1911, p. 33.

¹"The awareness of any thing, event, or fact when it is not present to the senses we shall call an *idea*." GATES, A. I.—*Psychology for Students of Education*. New York: The Macmillan Company, 1923, p. 298.

²"———but this condensation is not a mere compressing; it is rather a picking out of the salient, the prominent, the significant features, and the casting aside of those features that are merely accessory." BAGLEY, W. C.—*The Educative Process*. New York: The Macmillan Company, 1905, p. 139.

immediate sensory elements" tend to fade out. An idea that represents a considerable degree of condensation is called a concept. Frequently it is designated as "abstract."

A number of other terms are used in designating items of knowledge but the distinctions that they imply are not very helpful in considering the problems of this chapter. The distinction between concrete and abstract ideas will be needed occasionally, but in general the reader may consider ideas, meanings, and concepts as synonymous. A "fact" may be defined as a statement of the relation between a particular concept and a general concept; a "principle" as a general fact; and a "law" as a principle whose validity has been demonstrated.¹

Acquiring knowledge.—A student is said to have acquired an "idea" when, in response to "appropriate stimuli," he is able to revive the "image and its attendant halo of kinæsthetic and other organic sensations" which constitute the meaning phase of the idea. A student's store of ideas is determined by the range of stimuli to which he responds and by the vividness and comprehensiveness of the revived images and halos. To acquire an idea means not only to experience in order to have images to revive, but also to become sensitive to appropriate stimuli. These may be material objects that are apprehended by means of the sense organs, but they are often language symbols or other ideas. The greater the range of stimuli to which one is sensitive, especially language symbols and other ideas, the higher the quality of one's store of ideas.

This emphasis upon the ability to respond to a wide range of stimuli is only another way of pointing out the importance of association and organization in the acquisi-

¹These are essentially the definitions given by BAGLEY, W. C.—*Educational Values*. New York: The Macmillan Company, 1911, p. 28 f.

tion of knowledge. In habit formation a bond is to be established between a response and a single stimulus so that the response will be made only when this stimulus operates. In acquiring knowledge a response is to be connected with many stimuli.

Words, phrases, and sentences, symbols of knowledge.
—After one has acquired an idea, he may name it by assigning a word or phrase to it, in much the same way as a student in algebra “lets x =a quantity to be found.” For example, in the course of my thinking about the direction of learning I have evolved a concept that I named “learning exercise.” “Motivation,” “immediate objectives,” “need,” “halo,” “mastery,” “activities of adult life,” “hierarchy of objectives,” and the like have been used in the preceding chapters as symbols for other concepts. In the course of our social development several systems of symbols have been evolved for representing ideas. The Egyptians used a system of hieroglyphics or pictures; some kind of sign language is found among primitive peoples; and to-day many national groups have a language of their own. English-speaking peoples use a set of symbols, oral and written, which we call the English language. In addition we use a variety of miscellaneous signs such as extending the left arm in a certain position to indicate a turn when driving an automobile, nodding to an acquaintance, symbols on road markers, and the like.

When a learner establishes a word or phrase as a symbol for an idea, meaning, or concept, he tends to use the symbol in the place of the “image plus the attendant halo” in much the same way that a student in algebra uses the “ x ” he has designated as “equal to a quantity to be found.” As he is formulating the equation, he keeps in mind the meaning of x , and the other symbols used; but after the

equation has been stated, he manipulates the symbols without any thought of their meaning. Likewise when one uses words and phrases in thinking, the "images and the attendant halos" may be relatively vivid in his consciousness, but frequently both the "image" and its "halo" tend to be very indistinct and sometimes to fade out almost entirely.¹

The substitution of words and phrases for ideas is a means of economy in thinking. The saving of time and energy is comparable to that effected in algebra by assigning x , y , and other symbols to represent the "unknown quantities" of a problem.² A person who has not acquired a considerable equipment of words and phrases as symbols for his ideas is limited to relatively crude thinking. The phrase "immediate objectives in first-year algebra" stands for a group of ideas and can be used as a symbol to represent these ideas in thinking about questions relative to the teaching of that school subject. The reader of this text probably has acquired a number of language symbols such as "controls of conduct," "specific habits," "motivation," and the like which facilitate his thinking about questions relative to the direction of learning. One's dependence upon familiar language symbols is illustrated in learning to speak or write a foreign language. Most persons formulate

¹" . . . in the early years of childhood, the words used are always associated with concrete imagery . . . with practice in the use of words, the imagery becomes more and more schematic, more and more symbolic . . . until a point is reached where the expert in a certain field images very little, perhaps not at all so far as he can discover." BAGLEY, W. C.—*The Educative Process*, p. 146.

²"So we have come to think mainly in words, as the most rapid and accurate means of handling our meanings, of using our experiences. With children and uneducated persons—actual articulation is very common as they think or read. The thinking may indeed be done in part with images as signs of meanings, but is far more usually and advantageously done with words as instruments." HUEY, E. B.—*The Psychology and Pedagogy of Reading*. New York: The Macmillan Company, 1908, p. 163.

their ideas in terms of their own language and then translate them into the foreign language because they cannot think except in terms of symbols and find it difficult to learn to use a new set of symbols.¹

Pedagogical significance of knowledge symbolism.—

The use of words, phrases, and sentences as symbols for elements of knowledge has a significant bearing upon the teacher's task of engendering this rubric of controls of conduct. In the course of our social development, ideas, facts, and principles have been evolved as the result of experiencing and generalizing. As items of knowledge have been produced, symbols have been assigned to them and many of the useful products of experiencing and generalizing have been recorded in books. Thus the child of to-day finds a very elaborate set of ready-made symbols, and in many cases he encounters the symbol before he has the idea, fact, or principle for which it stands. The acquiring of knowledge should be accompanied by the learning of words, phrases, and sentences, but one may learn to write or speak such words and phrases as democracy, intelligence, pragmatism, index number, coefficient of correlation, scientific, socialism, evolution, calculus, infinity, reciprocity, Constitution of the United States, and the like without learning much or any of their meaning—that is, without acquiring the ability to revive the “images and attendant halos” that constitute the meaning of these symbols. The memorizing of words, phrases, and sentences is relatively easy; frequently the acquiring of ideas, facts, and principles is difficult. A child may acquire considerable skill in using certain symbols of knowledge without

¹For a more extended discussion of the relation of language to knowledge, see DEWEY, JOHN.—*How We Think*. Boston: D. C. Heath and Company, 1910. Chapter XIII.

acquiring many, if any, of the ideas that the symbols represent. Parrots can be taught to talk, that is, to speak words, but such learning does not include learning the ideas that the symbols represent to an educated person. A pupil in the elementary school could easily learn to respond to the question, "What is the purpose of education?" by speaking or writing, "The purpose of education is to prepare children for effective participation in the activities of adult life." However, the learning (memorizing) of this sequence of symbols would probably be accompanied by a very limited learning of the principle the sentence is intended to express. Teachers commonly base their estimates of a student's ideas, facts, and principles upon his performance in writing or speaking words, phrases, and sentences. Consequently the student has a strong motive to learn the symbols of knowledge. By the time he reaches the high school he has discovered that he is credited with high achievement if he can repeat the words of the text, or otherwise exhibits fluency in using the symbols of knowledge. Consequently he focuses his effort to learn upon these rather than upon their meaning. However, the ability to speak or write words and phrases, or even complete sentences, is not necessarily accompanied by the ability to associate with them the ideas for which they are symbols. A student does not acquire much knowledge without learning words, phrases, and sentences,¹ but he may learn the symbols without acquiring any knowledge. A small vocabulary is indicative of a limited stock of ideas, but a "flow of words" is not proof of much knowledge.

¹" . . . there is a necessary parallelism between the development of vocabulary and the development of clearly defined percepts, concepts, feelings of meanings, and the like. The development of individual meanings cannot proceed very far

Meaning of words and phrases versus specific habits.—

Since "knowing the meaning of a word or phrase" is interpreted as "ability to respond to the spoken or written symbol by recalling its meaning," one may ask, "What is the difference between this ability and a specific habit (fixed association)?" In some cases there is no difference. When a soldier "knows the meaning of" such commands as "halt," "column right," "shoulder arms," and the like, the connection between the spoken command and the corresponding idea (in this case usually expressed in terms of action) may properly be described as "fixed." The distinction between "knowing," representing a knowledge control of conduct, and a fixed association is one of degree. In order that a given control of conduct may be classed as a fixed association the connection between the symbol (word or phrase) must be firmly established. Thus the repeated use of a word or phrase with a definite meaning will result in a knowledge control of conduct becoming a fixed association. Whenever the meaning of a word or phrase is definite and always exactly the same, the learning of it may be carried to the level of a fixed association. Probably this should be done in the case of such terms as exponent (in algebra), parallelogram, multiply (in arithmetic), per cent, chemical formula, and boiling point.

The meaning of many words and phrases is not a definite, fixed thing; it is rather a bundle of meanings or "cues" of conduct. For example, the name of a large city such as New York, Chicago, or San Francisco represents a bundle of meanings and the meaning to be associated with the symbol, New York, in a particular sentence depends

without the development of the corresponding vocabulary." INGLIS, ALEXANDER.—*Principles of Secondary Education*. Boston: Houghton Mifflin Company, 1918, p. 426.

upon the context. The meaning of words such as transportation, communication, motivation, elevation, necessary, accurate, sufficient, commodity, investment, function, river, harbor, and the like, varies with the context in which they appear. A person who "knows" their meaning is one who is able to recall the particular meaning or shade of meaning that the spoken or written word is intended to represent in a particular case.¹ When a fixed connection is established between a word or phrase and its meaning, a definite meaning must be singled out for memorizing. Hence, "knowing the meaning of a word or phrase" sometimes represents a fixed association (specific habit) and sometimes an item of knowledge, i. e., an adaptable control of conduct. This distinction is one of degree but it will be helpful in considering the engendering of knowledge.²

Knowing a fact.—"Knowing a fact" may be described as "knowing the meaning of two or more words or phrases plus a relation between them." For example, the statement "Washington was the first president of the United States" expresses a fact. Knowing this fact involves being able to associate appropriate ideas with "Washington," "first," and "president of the United States" plus the recognizing of the relation between them, so that when "Washington" is mentioned the other two will tend to follow, or when "the first president of the United States" is mentioned "Washington" will be the response.

¹ADAMS, JOHN.—*Exposition and Illustration in Teaching*. New York: The Macmillan Company, 1910, p. 120 f.

²The distinction between specific habits (fixed associations) and knowledge involves several controversial questions. Some authorities do not agree with certain of the statements made here. For a critical review of a number of opinions and the results of certain investigations see: TILTON, J. W.—*The Relation between Association and the Higher Mental Processes*, Teachers College, Columbia University Contributions to Education, No. 218. New York: Bureau of Publications, 1926, 55 pp.

Facts are usually listed as a type of knowledge but when they have been *memorized*, that is, when the connection or association between the two or more ideas has become *fixed*, we have a different type of achievement, a fixed association or specific habit. It is not possible to specify a definite line of demarcation by means of which one may distinguish between a "fact" that should be classified as knowledge, and a "memorized fact" that should be described as a fixed association. The difference is one of degree but the recognition of the distinction will assist in understanding the nature of achievement in school subjects. In addition to the difference in the degree of "fixedness of the association," the memorization of a fact is usually accompanied by a tendency to crowd the meaning imagery into the background of one's consciousness and to establish a connection between the words and other symbols used to represent the ideas. For example, when a student has memorized the fact, "Washington was the first president of the United States," he is likely to respond to the question, "Who was the first president of the United States?" without bringing into his consciousness the ideas represented by the words used in stating the fact. If any ideas are revived, they will usually be very indefinite.

Dynamic knowledge.—We have called knowledge an adaptable control of conduct, but we can make a more precise statement by saying that items of knowledge are the materials out of which we may manufacture responses when difficulties are encountered; i. e., when specific habits fail to provide satisfactory ready-made responses. However, ideas, facts, and principles provide responses for new situations or difficulties only when they are used. Frequently students who fail to respond correctly offer the

excuse, "I knew the answer but could not think of it," or "I didn't know that was what you wanted." It is a common observation that many graduates of high school and of college fail to apply the knowledge that they possess, or are credited with possessing. The term "mere information" is used to designate the achievements of a person who is able to recite many facts and other items of knowledge, but who is inefficient in meeting difficulties. Hence, it is appropriate to ask what qualities are required to make knowledge dynamic,¹ that is, to insure its use when the need for it arises.

Obviously the use of an item of knowledge depends upon its entry into a person's consciousness at the time when a difficulty is encountered. One cannot apply what he does not remember. The recall of an idea, fact, or principle is dependent upon the number of stimuli² with which it is connected and the strength of the connections. Hence, it is obvious that students should be assigned exercises that will afford opportunities for connecting each idea acquired with a number of other ideas. Explicit requests to prepare an outline of the discussion of a topic are frequently effective in securing organization of ideas. Thought questions asking for analysis or comparison also have this function. Whenever a student brings together a group of ideas,

* ¹The idea represented by the phrase "dynamic knowledge" is sometimes expressed by the word "power." A person's intellectual power is due in part to mental qualities commonly designated as "general intelligence," but as evidenced in meeting difficulties it is affected by the dynamic quality of his knowledge. Kilpatrick describes the same quality when he refers to the controls of conduct possessed by the person who "sees" what is to be done or the need for action, who "can" do what should be done, and who "will" do it. KILPATRICK, W. H.—"An Effort at Appraisal," *Twenty-Fourth Yearbook of the National Society for the Study of Education, Part II*. Bloomington, Illinois: Public School Publishing Company, 1925, p. 282.

²These stimuli may be other items of knowledge as well as objects or symbols.

facts, and principles in formulating a response to a novel situation, associations are formed which tend to tie together the several items of knowledge. On a future occasion the recall of one item will be accompanied by a tendency to recall the others also. Thus the dynamic quality of knowledge is increased by the use of it in overcoming difficulties.

The dynamic quality of knowledge is dependent upon the strength of the connections as well as their number. Hence, there must be considerable repetition in the acquiring of knowledge. However, repetition in engendering knowledge differs from that designed to engender fixed associations (specific habits). In the latter case the stimuli (exercises) should involve relatively few variations. (See page 13.) When knowledge is to be engendered, the exercises should be varied.

The dynamic quality of knowledge affected by one's attitude toward difficulties.—The extent to which one's conduct is controlled by what he knows, that is by his store of knowledge, depends in part upon his attitude toward the new situations and difficulties encountered.¹ If he is accustomed to make the first response which comes into his mind, if he habitually seeks assistance as soon as he encounters a difficulty, or if he allows his conduct to be determined by his prejudices, his knowledge has little or no opportunity to function. On the other hand, if he is accustomed to be deliberate in making judgments, if he has become self-reliant, if he does not allow his prejudices to determine his actions, his knowledge has an opportunity to become a potent factor in controlling his conduct.

¹This is equivalent to saying that the effectiveness of one's store of knowledge as a control of conduct depends in part upon his acquisition of certain general patterns of conduct (principally attitudes). For a discussion of attitudes see Chapter X.

Thus the engendering of ideas, facts, and principles must be supplemented by training students to suspend judgment, to rely upon their own resources as far as possible, and to avoid being influenced by prejudices.

Perceptual experiencing the basis of knowledge.—The function of perceptual experiencing is to provide the “images and halos” that constitute the basic elements of knowledge. It is frequently said that one acquires an idea of a hammer by using it; an idea of football by playing or observing the game; an idea of an apple by feeling, seeing, smelling, and eating it. Such statements are only a way of saying that perceptual experiencing furnishes the material for the meanings associated with objects and events, and in turn with language symbols. Without a usable foundation of perceptual experiences one could not acquire knowledge, that is, he would not have any meaning to associate with objects and events, or with language symbols. The effect of the lack of a usable foundation of perceptual experiences is illustrated in certain forms of aphasia. Another type of illustration is furnished by the child who called a fern a “pot of green feathers.” He used the perceptual experience that seemed suitable.

On the other hand, many persons handicapped in perceptual experiencing by the lack of one or more sense organs have succeeded in acquiring a large number of ideas, facts, and principles. One of the most notable cases is that of Helen Keller who lost her sight and hearing at the age of 19 months but graduated from Radcliffe College and has gained considerable fame as a writer and speaker. The persons who enjoy the most abundant opportunities for experiencing (seeing, hearing, doing, etc.) are not necessarily those who acquire the greatest number of ideas or the most meaningful ones. As was stated in the beginning

of this chapter, the various types of learning activity in which the student engages should be "balanced." Perceptual experiences must be condensed, and frequently it is efficient to take the "short cuts" provided by "tracing the thinking of another person" and "comprehending the products of thought." The student should also use his knowledge in overcoming difficulties.

The process of perceptual experiencing.—Much of the perceptual experiencing that teachers stimulate and direct involves only visual sensations, but frequently the sensory element is complex, resulting from the functioning of several sense organs which is commonly described as "doing." For example, in cooking a meal in the laboratory, a girl sees, touches, smells, notes degrees of heat or cold, perhaps tastes, and makes movements that result in sensations of pressure, strain, and other organic conditions. A student performing an exercise in the physics laboratory sees the apparatus with which he is working but in addition he experiences many kinæsthetic sensations as he manipulates it. In playing football, baseball, basketball, golf, and the like, kinaesthetic sensations predominate although a participant also sees, hears, smells, feels pain, and notes degrees of temperature.

Perceptual experiencing involves more than the functioning of sense organs. Previous experiences must be revived to furnish the "halo" that surrounds the immediately evoked sensations. This phase of perceptual experiencing is obviously dependent upon the kind, frequency, and recency of the student's previous experiences. It is also influenced by his "present frame of mind" or "mind set." Parker¹ gives a striking illustration of the ef-

¹PARKER, S. C.—*Methods of Teaching in High Schools, Revised Edition*, Boston: Ginn and Company, 1920, p. 305.

fect of one's present frame of mind. Riding on a train one Monday morning with a "mind set" that he describes as "bargain hunting," he caught a glimpse of a headline in the paper that a passenger in front of him was reading. He read the headline:

GOOD HATS A QUARTER

Examining the paper later to find where such bargains could be secured he discovered that the statement was

GOD HATES A QUITTER

The headline belonged to an account of a Sunday sermon rather than to an advertisement. The influence of one's "mind set" suggests that when perceptual experiencing is considered as a learning activity, the stimulation of an appropriate "frame of mind" is an important phase of the teacher's task.¹

Vicarious experiencing.—Provided that a person possesses the necessary foundational experiences he may experience vicariously what others have done, seen, heard, etc., by reading descriptive accounts or through listening to oral presentations. Printed or spoken words and phrases serve as stimuli to which the reader or listener responds by reviving in his consciousness images that may correspond very closely to those in the mind of the original experimenter. Thus a competent reader follows an author to foreign lands, meets the characters of a story, participates in adventures, visits cities, sees the beauty of a landscape

¹This topic is frequently considered under the title of "apperception." See page 150. For more extended discussions see: McMURRY, CHARLES A.—*The Elements of General Method*. New York: The Macmillan Company, 1903, Chapter VI. JAMES, WILLIAM.—*Talks to Teachers*. New York: Henry Holt and Company, 1899, Chapter XIV.

or of a sunset, or visualizes a football game. Likewise, a listener to a vivid oral description may experience second-hand the things described. Demonstration lectures and pictures, especially moving pictures, also give opportunities for vicarious experiencing.¹

If the student has an adequate foundation of direct perceptual experience, observing demonstrations by the teacher may be a highly efficient learning activity. This statement is supported by experimental evidence. After reviewing reports of eight investigations relating to the teaching of science on the high-school level, Downing² states:

"The lecture-demonstration method of instruction yields better results than the laboratory method in imparting essential knowledge and is more economical of time and expense. This is true for both bright and dull pupils and for all types of experiments. The lecture-demonstration method appears to be the better method for imparting skill in laboratory technique in its initial stages and for developing ability to solve new problems."³ However, the reader should note that in order to be efficient as a learning activity, observing must be active and not passive. In observing, the student should have a purpose; he should know what to look for and then direct his attention to those

¹It should be noted that looking at pictures and observing a demonstration are also forms of perceptual experiencing. When looking at a picture, a student experiences directly the seeing of the picture and may experience vicariously the object, scene, or action represented.

²DOWNING, ELLIOT R.—"A Comparison of the Lecture-Demonstration and the Laboratory Methods of Instruction in Science," *School Review*, 33:688-97, November, 1925. See also: THORNDIKE, E. L.—*Education*. New York: The Macmillan Company, 1912, p. 178.

³A similar conclusion is reported by ANIBEL, FRED G.—"Comparative Effectiveness of the Lecture-Demonstration and the Individual Laboratory Method," *Journal of Educational Research*, 13:355-65, May, 1926.

phases of the object or event. Frequently observation must be analytic.¹

The development of knowledge.—Many ideas result directly from experiencing both direct and vicarious, but a student may develop ideas, facts, and principles by thinking about his experiences; i. e., by analyzing and comparing them. Concepts, facts, and principles developed from experience may in turn be compared and organized to form new knowledge. In this way many items of knowledge such as general principles and laws have been so far removed from basic experiences that they are described as "abstract." Abstractions, however, are highly important controls of conduct. In addition to epitomizing experience they furnish general rules and principles which we can apply in responding to a considerable variety of situations.

One also learns through using the knowledge that he already possesses. In manufacturing responses to new situations one forms new associations and hence enriches the meanings which he has previously acquired. Starting with the basic raw materials of perceptual experience, one's store of knowledge grows as he analyzes, synthesizes, compares, abstracts, generalizes, and applies. Given an adequate foundation of perceptual experience a person may erect a large structure of knowledge through reflective thinking.

The process of development.—Since the learner begins with particular experiences which he "condenses" in formulating generalizations, the process of development has been described as "inductive." It involves analysis, comparison, association, and abstraction. Although development of knowledge is not a mechanical process, it is possible to describe it in terms of certain phases or steps.

¹See "Giving a learner a correct start in acquiring motor skills," p. 127.

Herbartian five formal steps, a description of inductive development.—Certain followers of Herbart¹ formulated an analysis of the process of developing knowledge which is generally called the “Herbartian five formal steps.” The usual description of these steps assumes that the development takes place during the recitation period and under the teacher’s immediate stimulation and direction. The “Herbartian five formal steps” have been widely used as an outline in the planning of teaching. In the following description the titles of the first and second steps, “preparation” and “presentation,” suggest teacher activity, but the descriptive statements point out the nature of the learner’s activity.

I. PREPARATION

In this step the students are expected to become acquainted with the aim of the lesson and to recall experiences and information relating to this aim. As a result of doing these two things they should acquire the right “frame of mind” for the following steps.

II. PRESENTATION

In this step students engage in new experiences either direct or vicarious, and recall knowledge that they will utilize as data in the development of new knowledge.

III. ASSOCIATION, COMPARISON, AND ABSTRACTION

The nature of this step is indicated by the three descriptive terms in the title. Experiences and other items of knowledge

¹HERBART (1776-1841) through his *Outline of Educational Doctrines* (originally published in 1835; translation, The Macmillan Company, 1901) influenced the educational theory of a group of educators in the United States who at one time were known as Herbartians. The steps of a development lesson given here were formulated by followers of Herbart in the United States, among whom Charles DeGarmo, Charles McMurry, and Frank McMurry were perhaps the most prominent. See McMURRY, CHARLES A., and McMURRY, FRANK M.—*The Method of the Recitation*. New York: The Macmillan Company, 1903, pp. 74-235. BAGLEY, W. C.—*The Educative Process*. New York: The Macmillan Company, 1905, pp. 285-304. COLVIN, S. S.—*An Introduction to High School Teaching*. New York: The Macmillan Company, 1917, pp. 295-309.

are classified and through comparison common characteristics are noted in an effort to discover a general concept, rule, or principle.

IV. GENERALIZATION

The step of generalization is the culmination of associating, comparing, and abstracting. The concept, rule, or principle is now formulated.

V. APPLICATION

The development of knowledge is completed in the fourth step but application is added in order to give the student an opportunity to attain mastery through using the knowledge he has discovered. It also provides a means of verification.

Development of knowledge considered as a type of reflective thinking.—Critics of the “Herbartian five formal steps” have pointed out that the development of knowledge is deductive as well as inductive and hence that the process should be considered as a case of reflective thinking, which is usually described in terms of the following steps or phases:

- I. Defining one's problem
- II. Collecting data
- III. Formulating a tentative hypothesis
- IV. Verifying this hypothesis

The process of reflective thinking, however, is not as systematic as this description may imply. Usually a learner who is inclined to think about his experience does not wait until he has collected all of his data before he makes a tentative generalization, but makes a hypothesis after a few experiences and then verifies it by comparing it with future experiences or other data. If the tentative hypothesis proves unsatisfactory it is necessary either to modify it or to formulate a new one and again verify. It may be necessary to collect additional data or even to re-

define the problem. The thinking must be continued until a satisfactory hypothesis is formulated.

These four steps of reflective thinking describe the process as it occurs in solving problems¹ rather than in the development of knowledge from experiences. In the latter type of mental activity there seldom is a clearly defined problem which guides the thinker in his efforts. The "collecting of data" consists largely of recalling experiences, and the formulation of hypotheses and verification are emphasized.

"Short cuts" in developing knowledge.—Instead of discovering generalizations by going through the process of development as described in the preceding paragraphs, the student may read an account of the development effected by someone else or may listen to an oral account of it. In such cases "reading" and "listening" may be described as "tracing the thinking of another person." In this activity the learner is not a pioneer; he is a follower, a tourist on a personally conducted tour. The method may be described as a "short cut" in the development of knowledge. A student may even take the products of another person's thinking and comprehend them without tracing the process of development by which this knowledge was originally produced. For example, a student may comprehend a formula in science, a rule in mathematics, a generalization in history, and the like without going through the process of development. In fact many, perhaps most, of the concepts and principles which we use were originally developed by someone else; and we have appropriated the products of their mental activity. Although the learner must be mentally active in tracing the development of another, and comprehending the products

¹Problem solving is considered in Chapter VIII.

of another's thinking, these activities represent significant economies of time and effort in the acquiring of knowledge. The learner cannot begin where a "producer" of knowledge left off, but he need not go back to the beginning and develop all of his knowledge from direct perceptual experiences. Only by profiting by the experiences and the thinking of others is it possible for each generation to advance a little farther than the preceding in accumulating knowledge.¹

When should a teacher endeavor to secure the development of knowledge?—The fact that certain "short cuts" are open to the learner in acquiring knowledge raises the question, "When should the teacher guide students to these short cuts and when should he endeavor to secure original development?" Several advantages are claimed for the development of knowledge by the learner: (1) The knowledge acquired will be remembered longer. (2) Since the student has discovered the rule or principle once he will probably be able to reconstruct it if he fails to remember it. (3) A generalization which a student has discovered is likely to be understood better by him than one which has been given to him ready-made. (4) Since a student has discovered the item of knowledge, it is more likely that he will be able to develop a modification of the rule or principle when such is required in controlling a new situation. (5) Practice in generalizing experience tends to make one self-reliant and independent. If a student has become accustomed to discover things for himself he will learn much more from his doing, seeing, hearing, etc., than one who has not. He will not be helpless when sources of ready-

¹The direction of these two learning activities, "tracing the thinking of another person" and "comprehending the products of thought," will be considered in Chapter VII.

made knowledge are not accessible. (6) The feeling of pride produced by discovery will stimulate further learning.

On the other hand, there are certain limitations or disadvantages which should not be overlooked: (1) The discovery of many facts and principles is so difficult that the development of them is beyond the capacity of most high-school students. Some rules and principles which now seem very simple and obvious to us were overlooked by some of the most brilliant thinkers the world has ever known. Illustration of this fact is furnished by the law that when the resistance of the air is eliminated a "light" body will fall at the same rate as a "heavy" one, and by the fact that the earth is round. These items of knowledge were not discovered (developed) by Socrates, Aristotle, Plato, and others who undoubtedly possessed high intelligence. Newton developed the Law of Gravitation from phenomena that many had observed before him. (2) Students frequently do not possess the necessary experiences for developing needed generalizations. (3) The development of knowledge which students may acquire from their textbooks is seldom economical of their time. It can be acquired more quickly through a "short cut." (4) A fourth limitation grows out of the conditions attending class instruction. The thinking of the several students will not be uniform. Seldom will they have the same "frame of mind," and they will vary with reference to their basic experiences. Other variations will exist in their analyzing, associating, comparing, and abstracting. Since development is not a definite activity, the teacher may have difficulty in stimulating all his students to be mentally active. Frequently, the bright students will do the original thinking and the slower ones will be merely fol-

lowers. The teacher is likely to feel that the development must move forward on schedule if time is not to be wasted; and as a result he makes suggestions that are likely to approach "telling" for many of his students and hence to deprive them of the opportunity for developing the rule or principle. If in an effort to avoid this result the teacher pursues a policy of "watchful waiting," the students are likely to wander, even to the extent of focusing their attention on other matters. Finally, some students will reach the generalization before others, and the announcement of their discoveries will tend to "tell" the rule or principle to the remaining members of the class. If instruction is individualized, this fourth limitation will, of course, not exist; but when a teacher is directing the learning of a group of students, it constitutes a serious obstacle to development.

In view of the limitations of development it is the judgment of the writer that the high-school teacher should not attempt much formal development of knowledge that students can find in their textbooks or that he can conveniently "tell" them. He will seldom find it advisable to plan a formal development lesson. There will, however, be numerous occasions, particularly in history, literature, and science, when he may guide his students to develop generalizations not explicitly given in their texts. The teacher should be alert for all occasions when development may appropriately be stimulated in order that he may engender in his students the custom of analyzing, associating, comparing, and abstracting their experiences. This pattern of conduct is important. Teaching experience is considered an important qualification in the appointment of teachers, but the experience in itself is not as important as the development of knowledge from it. The explanation why

so many people learn very little from their experiences is that they do not associate, compare, and abstract what they have experienced, and thereby fail to discover rules and principles which might serve as controls of conduct.

The teacher should bear in mind that the development of knowledge cannot be forced. For this reason, learning exercises cannot always be planned in advance. However, the alert teacher will find many opportunities in class discussions for developing generalizations incidentally. When the attention of the members of the class is focused upon appropriate basic experiences, it is relatively easy for the teacher to stimulate them to analyze, associate, compare, and abstract. Frequently he can do this by asking a question. Diligence on the teacher's part in making use of incidental opportunities for development will tend to engender in students a tendency to think about their experiences and to develop many things without his immediate direction.

Development of meaning for statements of generalizations.—The discoverers of knowledge have recorded the results of their thinking in language symbols. As we pointed out in the first pages of this chapter, rules and principles are abstracted or removed from particular experiences in the process of generalization; and when they are expressed in terms of language symbols there is frequently little or nothing in the statement to suggest their source or the process of their development. One of the most difficult tasks the teacher faces is the stimulation and direction of students in the development of meaning for such words and phrases as democracy, motivation, subject-matter, coefficient of correlation, and the like. It is very easy for a high-school teacher to underestimate and consequently to neglect the difficulties that students

encounter in reading their textbooks or in listening to his own statements.¹

The development of meaning for statements of generalization will not usually be identical with the original discovery of the generalization. If a student encounters the abstract phrase or sentence before he has built up the meaning out of his experiences, the process is one of explanation rather than development. However, a teacher may anticipate these encounters by his students and devise exercises that will lead to the development of many of the generalizations that they will meet later. This may be done even though it is judged inadvisable to introduce the formal statement of the generalization.

Development of connections between school subjects.—A student's learning in high school is divided into subjects and is usually distributed among several teachers. This condition creates the need as well as the opportunity for the development of connections between the subjects that the student pursues. A frequent criticism of our schools is that the training we give boys and girls is divided into water-tight compartments. In view of the fact that great variation exists in the programs of studies that students elect, the authors of our textbooks cannot do much to remedy this situation. The responsibility for developing appropriate connections between the different subjects therefore rests upon the teachers. By asking appropriate questions they may stimulate students to associate, compare, and abstract the knowledge acquired in different subjects and thus to develop new knowledge. In history, literature, and science there are many opportunities for this type of development.

The teacher's responsibility for providing perceptual

¹This topic is treated more fully in Chapter VII as a phase of reading.

experiences.—By the time students enter high school most of them have acquired a large store of basic perceptual experience from their activities in their homes and the community and from their training in the elementary school. In many cases, they will have visited local industries and large numbers will have traveled, in some cases extensively. Practically all will have engaged in a type of perceptual experiencing by attending the “movies.” Illustrations in newspapers, magazines, and books afford another source of experiencing. These conditions affect the teacher’s responsibility for providing opportunities for perceptual experiences in connection with the subject he is teaching. He should capitalize the previous perceptual experiences of his students, and provide opportunities for experiencing only when they are needed. No rule can be stated. A teacher must decide in each case whether the previous experiences of the members of his class and the facilities available justify the assignment of a laboratory exercise, a field trip, a visit to a local industry, the use of the stereopticon, moving-picture machine, or other visual aids.

The apparent interest of the students in such exercises is not a sufficient criterion. Students may “like” field trips, illustrated lectures, laboratory exercises, and the like because they are considered entertaining or simply because they afford opportunities to avoid doing other kinds of learning exercises. Frequently it is desirable to substitute a demonstration lecture for a laboratory exercise.¹ Also under certain conditions it will be advantageous to substitute other types of vicarious experiencing for direct experiencing.

¹See page 165 for the relative merits of lecture demonstrations and laboratory exercises.

Learning exercises for perceptual experiencing.—A large group of opportunities for perceptual experiences may be listed under the general title of "laboratory exercises." Since numerous laboratory manuals are available, the teacher is relieved of much of the responsibility for devising such learning exercises. Frequently the limitations of equipment will necessitate some modification of the exercises given in the manual and in some instances it may be desirable to substitute more appropriate ones.

In addition to the exercises of the laboratory and the shop, teachers may make use of films, slides, opaque projection, stereograph views, pictures, charts, diagrams, and apparatus of various kinds, including models, exhibits, and collections of specimens, relics, etc. Field trips may be employed in chemistry, physics, the biological sciences, geology, general science, history and the other social sciences, art, English literature, vocational and manual subjects, and, under certain conditions, in mathematics, and in foreign languages. The dramatization of historical events and scenes in stories and plays affords a type of perceptual experience for those who participate; the members of the audience engage in a different type of activity.

In devising exercises designed to lead to perceptual experiencing, it is important to plan the details with care. Failure of the apparatus to work properly in a demonstration may destroy most of the value of the exercise. Defective projection of films or slides decreases the value of these visual aids. Delays in locating a map, chart, piece of apparatus, or other materials tends to lessen the value of the exercise. So far as possible the teacher should anticipate the need for perceptual experiencing and plan the exercises with care, but there are likely to be some occasions for extemporaneous exercises, such as those involving

diagrams, charts, or pictures, and the teacher should be sufficiently resourceful to "rise to the occasion."

Field trips and visits to industrial plants, museums, and the like, require careful planning in order to be efficient as learning activities. It is of course important that the teacher arrange with the persons in charge of the place to be visited so that the class will be welcome, but in addition he should instruct his students in regard to the things to be observed. Sometimes it may be advisable to issue mimeographed instructions. In the case of a visit to a manufacturing plant it is frequently desirable to arrange for a guide who will be able to explain the things and processes observed. The presence of a guide, however, does not relieve the teacher of responsibility for formulating definite objectives and general instructions in regard to the excursion.

In planning demonstration lectures and the use of visual aids,¹ the teacher should bear in mind that students tend to become passive when observing or listening. Learning is an active process, and hence decreases as passivity increases. The success of a teacher in arousing and holding the attention of his class during a demonstration or a descriptive lecture is dependent upon several factors, among which personality traits would be listed; and the determining factors probably vary from teacher to teacher. There are, however, certain procedures which appear to be somewhat generally applicable. In case important details of a demonstration are likely to be overlooked, the teacher may direct the attention of the class to such aspects by saying, "Notice what happens . . ." or "Notice how . . ." Sometimes a preliminary discussion may raise a question that

¹Demonstration lectures and the use of visual aids may be considered as exercises for vicarious experiencing. See page 165 for a discussion of this point.

will serve to focus the attention of the student upon the desired details of the demonstration. The effectiveness of a descriptive lecture in providing vicarious experiences depends upon what the teacher says and upon the illustrative aids he employs. All irrelevant material should be excluded. Important points should be emphasized. Charts showing outline drawings or diagrams on the blackboard are sometimes more effective than photographs. Slow-motion pictures frequently are very helpful. In devising learning exercises to provide vicarious experiences the teacher should bear in mind that the purpose is to educate students rather than merely to entertain them. Although it is true that, unless the teacher succeeds in making demonstrations and descriptive lectures interesting he will fail to secure vicarious experiencing, he should not sacrifice educative qualities nor let his classroom work degenerate into mere entertainment.

Preliminary exercises to secure appropriate mind set.¹

—The importance of the student's mind set was noted on page 163. It is therefore necessary for the teacher to devise preliminary exercises that will cause his students to be in an appropriate frame of mind before the perceptual experiencing begins. Sometimes this may be accomplished by asking appropriate questions. For example, in preparing for a field trip to observe trees and shrubs, the teacher might ask, "How does a maple tree differ from an oak in appearance?"; "How many different kinds of trees are found in this locality?" In some cases such questions may be made the basis of a preliminary class discussion. This tends to create a need for the perceptual experience. From time to time on a field trip it may be desirable for the in-

¹Preliminary exercises to secure an appropriate mind set come under the step of "preparation" in the Herbartian five formal steps. (See page 167-8.)

structor to call the group together and direct their attention to certain details he wishes them to observe.

Learning exercises to supplement perceptual experiencing.—It is generally agreed that it is advisable to assign exercises that will secure an intensification of perceptual experiences. A very common exercise for this purpose is the requirement of a written report.¹ As the student writes an account of what he has done or observed, his experiences are intensified and frequently he analyzes, compares, and organizes them. In addition, the requirement that laboratory experiments and other perceptual experiences be “written up” creates a need for careful observation. The written report also furnishes the teacher with evidence of the activity of his students. In the case of field trips, excursions, and similar experiences outside the classroom and laboratory, it is important to secure evidence of what the students did. Since the conditions of such experiences cannot be controlled at all, or at least only partially, by the teacher, a check upon their effectiveness is more important than in the case of laboratory exercises. As we have pointed out in a preceding paragraph, students frequently fail to observe important details. They may fail to do this even when the teacher has been diligent in directing the field trip or excursion. Furthermore, on such occasions there are likely to be distracting stimuli of which the impressions may over-shadow the desired perceptual experiences. Hence, the writing of a report will furnish the student with an opportunity for sorting out of his total experiences those pertinent to the objectives set by the teacher.

Although the preparation of a written report is usually a profitable learning exercise, its omission may be justified.

¹Expression as a learning activity is considered in Chapter IX.

When it seems wise to do this and frequently when a written report has been required, a class period devoted to discussing a field trip or even a demonstration lecture will represent a very profitable expenditure of time. In directing laboratory work it is frequently advantageous for the teacher to ask students what they are doing or observing. In addition to formal discussions of perceptual experiences, a teacher who is alert will find many occasions for incidental supplementation of laboratory exercises, field trips, and the like.

There is considerable difference of opinion relative to the wisdom of requiring students to take notes upon demonstration lectures or other vicarious experiences. Those opposed assert that the formulation and writing of notes interfere with participation in the experience, but this contention does not appear to be based upon dependable data. One investigation indicated that taking good notes on lectures tends to increase quiz grades.¹ As in the case of laboratory work the writing of a report constitutes a valuable supplementary learning exercise. Since students usually consider the writing of a report a much less interesting exercise than the observing of a picture or of a demonstration, such a requirement should not be overworked. It is necessary to rely upon immediate interest for much of the driving power in vicarious experiences of the sort we are here considering, and if distasteful exercises are added through the requirement of a notebook, motive is likely to be weakened.

Exercises leading to the development of knowledge.—The kinds of exercises to be assigned to secure development of knowledge have been described and illustrated by

¹CRAWFORD, C. C.—“The Correlation between College Lecture Notes and Quiz Papers,” *Journal of Educational Research*, 12:282-291, November, 1925.

writers who have accepted the Herbartian five formal steps as a description of the process of development.¹ First, there should be some preliminary exercises to create an aim or problem, as well as an appropriate mind set. The second kind of exercises is suggested by the step of "presentation." (See page 167.) There may be some exercises leading to perceptual or vicarious experiencing; questions may be asked to stimulate the recall of previous experiences and items of knowledge learned in other ways; new ideas, facts, and principles may be told to the students or they may be directed to read certain references. Following the phase of the development lesson designated as "presentation," the teacher should introduce exercises that will lead to analysis, comparison, association, synthesis, abstraction, and generalization. It is difficult to specify the characteristics of the learning exercises which will lead to these mental activities. If asked at the appropriate time, questions such as the following will frequently be effective as a basis of development: "In what respects are . . . (specific items to be inserted) similar? How do they differ? Would the procedure followed in this experience be appropriate for another situation?" After the development of knowledge has been begun by a student, the teacher may call other experiences to his attention and ask, "Is your tentative generalization consistent with these experiences?"

The particular kinds of questions that should be asked depend upon the general intelligence and training of the students. Many bright students will develop generaliza-

¹McMURRY, CHARLES A., and McMURRY, FRANK M.—*The Method of the Recitation*. New York: The Macmillan Company, 1903, 339 pp. This is one of the earliest expositions of teaching according to the Herbartian five formal steps. See also: COLVIN, S. S.—*An Introduction to High School Teaching*. New York: The Macmillan Company, 1917, pp. 295-309. BAGLEY, W. C.—*The Educative Process*. New York: The Macmillan Company, 1905, pp. 285-304.

tions without any exercises being assigned for this purpose. On the other hand, it is frequently difficult for the teacher to stimulate dull students or even those of average intelligence to develop principles and other generalizations. The teacher's ability to diagnose the situation he faces and to ask the right questions at the right time is an important factor in determining his success in directing the development of knowledge. The activities of analyzing, comparing, associating, synthesizing, abstracting, and generalizing cannot be forced.

Illustration of the development of a rule in algebra.—This illustration assumes a class in elementary algebra ready to begin learning the procedure to be followed in solving quadratic equations. It is also assumed that the students understand the principle "The square roots of equals are equal" and that they are able to recognize the roots of algebraic trinomials which are perfect squares. In this illustration the teacher's purpose is to direct the activities of the class period so that the members of the class will develop out of their experiences in solving particular quadratic equations a rule that describes a procedure which may be followed in solving all quadratic equations. The teacher should announce this purpose preferably by asking a question such as, "How may we solve an equation of the type $3x^2 + 7x - 11 = 17$? The teacher may begin the development by asking what two values of x satisfy the equation $x^2 = 25$. In case some student does not mention -5 as an appropriate value, the teacher should suggest it by asking, "Will the value -5 satisfy this equation?" The students may then be asked to solve such equations as the following:¹

¹In an actual development the number of equations which the students should be asked to solve may be greater or less than the number given here.

$$\begin{aligned}x^2 + 8x + 16 &= 25 \\x^2 - 10x + 25 &= 49 \\x^2 + 4x &= 5\end{aligned}$$

In connection with this equation the teacher may need to ask, "What number must be added to both sides of the equation to make the left-hand side a perfect square?"

$$\begin{aligned}x^2 - 6x &= 27 \\4x^2 + 20x + 25 &= 36 \\9x^2 - 30x &= 11 \\x^2 - 7x &= 4 \\7x^2 - 15x + 11 &= -8 \\ax^2 + bx + c &= 0\end{aligned}$$

After six or seven equations have been solved, the teacher should ask, "Can you make a general rule which tells how to solve all quadratic equations?" If the students are unable to formulate such a rule, they should be asked to solve additional equations, the type being varied, so that the rule may be made more obvious to them. When a rule has been "discovered," exercises for its application should be given in order to verify it. In case the proposed rule is faulty, the teacher may point out the error, but frequently a more effective procedure is to ask the students to apply it to equations that will reveal the fault. The teacher should remember that if there is to be real development, the students cannot be forced in the process of generalizing from their experiences. Any attempt to do so will change the type of instruction from a development lesson to "telling."

Motivating experiencing and development.¹—The problem of motivating experiencing and development of knowl-

¹Since the general topic of motivation was treated in Chapter IV, the discussion here will be limited to a few points which are particularly important in securing motive for the types of learning activity considered in this chapter

edge differs in certain significant respects from that of motivating the acquiring of specific habits. In the first place, the teacher is dealing with a different type of learning activity. The "attentive repetitions" in habit formation represent something definite to be performed. In many cases certain motor responses are involved. Such activity can be commanded and even repetitions of associations can be commanded in part. For example, the teacher may request a student to practice a certain exercise in music, to read aloud a passage of a foreign language, to type a selection, to participate in certain gymnastic exercises, etc. As observed in Chapter IV, a direct request is frequently sufficient to secure a motive for engaging in attentive repetitions. When a teacher wishes to motivate experiencing and development of knowledge, direct requests are less effective because frequently the activity desired cannot be definitely prescribed in the request. For example, a class in physics may be requested to "visit" an ice plant; but the verb "visit" does not define the desired activity very well. A request to "observe" will not be much more definite. Even if somewhat detailed instructions are given, the students probably will not understand what they are to do as clearly as when they are requested to "memorize" a formula.

"Development of knowledge" is less definite as an activity than experiencing. Hence it is more difficult to formulate exercises that prescribe the things that the student is to do. When the teacher asks detailed questions that call for analyzing, comparing, associating, synthesizing, abstracting, and generalizing, he tends to do the thinking for the student and sets a different type of learning exercise, a request to trace his own thinking.

Experiencing frequently immediately interesting.—Manipulating apparatus in the laboratory, making a dress, visiting the local electric light plant, observing a laboratory demonstration, and the like, are frequently immediately interesting activities and no motivating devices are necessary to secure active participation by high-school students. In such cases it is necessary only to indicate what is to be done. However, the teacher should bear in mind one caution. It may happen that the immediate interest of a student will lead him astray from the particular activity in which the teacher desires him to participate. For example, on an excursion trip the attention of some or all of the class may be focused upon irrelevant or unimportant details. Likewise in observing a demonstration, students may not secure the intended experience. Also, the instability of attention in experiencing complicates the teacher's problem. The requirement of a written report frequently assists in focusing the attention upon the important phases of the experience.

A need as a motive in experiencing and development.—A recognized need is not prominent as a motive in experiencing and development but frequently a need can be created which will stimulate the desired activity. This is accomplished mainly by delaying the experiencing and development until the need arises. For example, a need for observing an ice plant may be created by delaying the visit until questions concerning the making of ice have arisen in studying the topic. A need for the development of a generalization may be created by delaying the development until a student states a hypothesis or asks concerning the truthfulness of one. Occasionally students will ask for a rule or principle. Frequently a teacher can stimulate an-

alysis, comparison, etc., by suggesting an apparent exception to the tentative generalization.

Directing experiencing.—The teacher's direction of experiencing is accomplished mainly by means of the preliminary exercises designed to build up an appropriate mind set and the careful planning of the exercises which form the basis of the experiencing. In the laboratory and shop the teacher may ask questions and make suggestions as he observes his students at work.

Vividness of important details should be noted in evaluating experiencing.—Probably the most common fault in vicarious experiencing is the failure of students to give sufficient attention to important details. Therefore, in evaluating experiencing the teacher should give particular attention to the details which in his judgment are important. For example, reports of field trips should be judged primarily with respect to the statements relating to the particular things which the students were directed to observe. Neatness, quality of description, and grammatical accuracy should not be neglected, but they are not the most important characteristics.

Directing the writing of reports of experiences.¹—In directing the writing of reports of experiences, the teacher should bear in mind that the justification of a report is based on the value of its preparation as a learning activity rather than upon the value of the report itself. Sometimes very detailed instructions are given relative to laboratory notebooks. In fact, special notebooks have been prepared for reporting the experiments in certain manuals so that the student's work is limited largely to filling in a few blanks. Notebooks in the form of completion exercises or even

¹The more general topic, directing the organization and expression of knowledge, is treated in Chapter IX.

detailed instruction tend to limit the educative value of reporting an experience. Although students who are untrained in reporting need careful directing, the teacher should endeavor to engender a considerable degree of independence, originality, and resourcefulness in this activity.

There are a number of important questions relative to the treatment of the reports submitted by students. Should the teacher mark them, indicating errors and other shortcomings? Should they be returned to the students? Should the students be required to rewrite the reports, at least when the work is distinctly unsatisfactory? What attention should be given to neatness, spelling, punctuation, and other matters of form? No definite answer can be given which will be appropriate for all occasions. At the beginning of a course, the teacher should read the reports rather carefully and frequently it will be advisable to have some rewritten. Reasonably good English should be required. However, the teacher constantly should bear in mind the principle stated at the beginning of the preceding paragraph. A laboratory notebook or other report is not an end in itself.

Directing the development of knowledge.—The Herbartian five formal steps purport to describe the general procedure of directing the development of knowledge (see page 167), but these steps are stated in terms of a mixture of teacher activity and the mental processes of the learner. The function of the step of preparation is essentially directive. During it the teacher stimulates the students to build up an appropriate mental background or mind set. They should also acquire a concept of the aim or purpose. Frequently this can be secured by asking a question, but in many cases the teacher will be justified in making the direct statement, "The aim or purpose is——."

The teacher's task of directing the remaining steps of development is simplified by the fact that he occupies the position of a leader. He is *conducting* the recitation. Hence a teacher who is sensitive to the needs of his students for direction in their learning can supply information, offer a suggestion, call attention to an error, elaborate a statement and the like, when such procedures are needed.¹ However, the question is the teacher's most important directive instrument. It has been said that, "To question well is to teach well." The question, skilfully employed, is a powerful stimulus to thought, an incentive to action, and a guide to clear and vivid ideas.

Evaluating knowledge resulting from experiencing and development.—An important phase of the teacher's direction of development is the evaluation of the achievements of his students.² In doing this he should bear in mind the distinction between knowledge and the symbols of knowledge discussed on page 153. Ability to state a generalization is not proof of its development. In attempting to ascertain the results of a development lesson, the teacher should assign exercises that afford opportunities for the application of the generalizations. A general truth is not mastered until the student can apply it.

¹See the description of the development of a rule in algebra, page 182. Other descriptions of development lessons are given by: McMURRY, CHARLES A., and McMURRY, FRANK M.—*The Method of the Recitation*. New York: The Macmillan Company, 1903, Chapter II; and COLVIN, S. S.—*An Introduction to High School Teaching*. New York: The Macmillan Company, 1917, pp. 300-302.

²The evaluation of knowledge is treated more fully in Chapter VII and in Chapters XV and XVI.

LEARNING EXERCISES FOR THE READER

1. Show by giving a definition and an illustration that you understand the statement: "Knowledge is an adaptive control of conduct."

2. Give five illustrations to show the distinction between specific habits and knowledge.

3. Give an illustration, according to the definitions given in this chapter, of an idea, a fact, and a principle.

4. Explain the significance of the term "dynamic knowledge."

5. Explain and illustrate the statement: "Items of knowledge are the materials out of which we may manufacture responses when difficulties are encountered."

6. We often use such terms as "flighty," "narrow," "reliable," "dependent," "vacillating," "broadminded," and so forth in characterizing persons whom we know. Explain such characterizations in the light of the statement: "The dynamic quality of knowledge is affected by one's attitude toward difficulties."

7. Two persons visited an art museum and later attended a symphony concert. One "acquired knowledge" from these experiences, the other did not. Explain the reasons why in both cases.

8. Explain and illustrate the statement: "The dynamic quality of knowledge is increased by use of it in overcoming difficulties."

9. Montessori, the Italian educator, whose theories regarding education were much discussed during the early years of this century, believed in giving special training for the development of each sense, apart from the other senses. Thus, by enlarging the perceptual experiences of the child, his knowledge was increased. For example, the child blindfolded learned to separate silk cloth from linen, cotton, or velvet by the feel of the material, or to distinguish flowers by their fragrance.

Would you consider such isolated training of each sense so valuable that a system of education could be based upon it? Justify your opinion.

10. Through some experience of your own trace the development from perceptual experiences to acquired knowledge.

11. Discuss the function of reflective thinking in the acquisition of knowledge.

12. Explain and illustrate the statement: "We may appropriate the products of the mental activity of others."

13. Recall the perceptual experiences which you had during a field trip or excursion. Prepare a list of the directive procedures that your teacher employed.

14. Write a brief account of an especially interesting vicarious experience which you had as a class exercise and try to point out those things done by the teacher to stimulate or add to your interest.

15. Do you feel that the taking of notes during a demonstration or a descriptive lecture interferes with, or increases, your participation in the experience? Defend your statement.

16. In this chapter both the advantages and disadvantages claimed for the "development of knowledge by the learner" are given. Carefully compare these claims and then give two illustrations of occasions when you would consider the teacher justified in endeavoring to secure "development of knowledge by the learner."

17. "Concrete ideas are, at best, clumsy contrivances." (BAGLEY, W. C.—*The Educative Process*, p. 139.) What is the meaning of this statement? The word "contrivances" appears to be used as a synonym for "controls of conduct."

18. What is a concrete experience? Explain the phrase, "condensation of experience."

19. After reading pages 150 f, write out in your own words a description of knowledge.

CHAPTER VII

DIRECTING THE ACQUIRING OF KNOWLEDGE THROUGH READING

The reading of textbooks a prominent learning activity in American high schools.—Studying a textbook, which usually involves reading, is probably the most prominent learning activity in American high schools.¹ Most of the knowledge that high-school students are expected to acquire is recorded in textbooks, and reading affords a “short cut” in the acquisition of ideas, facts, and principles. In some cases the reader is “tracing the thinking of another person”; in others his activity may be described as “comprehending the products of thought.” Reading is also a means of “vicarious experiencing.”² In the social sciences, “studying” consists largely of reading. In general science, biology, physics, and chemistry, reading is somewhat less prominent as a learning activity. Problem solving and drill are conspicuous learning activities in mathematics but there is considerable reading in geometry.

The problems of this chapter.—The central problems of this chapter are the following:

¹Reading is also an important adult activity. Some facts relative to this are given by: JUDD, C. H.—“Relation of School Expansion to Reading,” *Elementary School Journal*, 23:253-66, December, 1922. See also GRAY, W. S.—“The Importance of Intelligent Silent Reading,” *Elementary School Journal*, 24:348-56, January, 1924.

²See pages 33-6 for a description of these types of learning activity.

1. What kinds of learning exercises should be assigned as the basis for reading?
2. What kinds of learning exercises should be assigned to supplement reading?
3. What rules relating to reading should a teacher suggest to his students?
4. How may the teacher evaluate the outcomes of reading?

In working out the answers to these questions it will be necessary to consider the nature of reading activity and certain allied questions.

The general process of silent reading.—In the activity of silent reading there are a number of mechanical elements such as the movements made by the reader's eyes.¹ The functioning of the reading mechanism is accompanied by the entry into the reader's consciousness of the ideas represented by the words and phrases seen. In the case of familiar words and phrases this activity involves only the reviving of ideas previously acquired.² When a word or phrase represents a new idea, it becomes necessary for the reader to develop it from the context or by referring to the dictionary or some other source. The process of silent

¹The mechanical aspects of reading have been subjected to careful laboratory study and it has been demonstrated that a good reading mechanism is essential for efficient comprehension. However, the mechanical aspects of reading are considered only incidentally in this text because the formal teaching of reading is assumed to be the responsibility of the elementary school. In the high school reading is employed as a tool of learning. One who is interested in the reading mechanism will find an excellent summary of the research on this topic in GRAY, W. S.—*Summary of Investigations Relating to Reading*, Supplementary Educational Monographs, No. 28. Chicago: University of Chicago, 1925, pp. 64-87.

²Associating meanings with familiar words and phrases is not as mechanical as might be inferred from this statement. The particular phase or shade of meaning must be determined from the context. See the quotation from Thorndike, p. 193.

reading is not completed with the act of associating appropriate ideas (meanings) with the words and phrases seen. These elements of knowledge must be synthesized into the meaning of the sentences and paragraphs. This activity is essentially reasoning.¹ Hence the general process of silent reading involves the operation of one's reading mechanism accompanied by the mental activities of associating meanings with the printed words and phrases and of combining these into larger meaning units.

This general description of the process of silent reading is misleading in one respect. It does not point out the variations that occur in the study of textbooks. In the enumeration of learning activities we listed vicarious experiencing through reading, tracing the thinking of another person, and comprehending the products of thought. In discussions of how to study we find such phrases as "rapid reading," "thorough reading," and the like. "Reading to remember," "reading to understand," and "reading for enjoyment" have also been used to designate variations in the reading process.

Variations in reading process described in terms of purposes.²—It appears that the purpose with which a

¹THORNDIKE, E. L.—"Reading as Reasoning: A Study of Mistakes in Paragraph Reading." *Journal of Educational Psychology*, 8:323-32, June, 1917. Also, "The Understanding of Sentences: A Study of Errors in Reading." *Elementary School Journal*, 18:98-114, October, 1917.

In the first of these articles Thorndike states: "Understanding a paragraph is like solving a problem in mathematics. It consists in selecting the right elements of the situation and putting them together in the right relation and also with the right amount of weight or influence or force for each. The mind is assailed, as it were, by every word in the paragraph. It must select, repress, soften, emphasize, correlate, and organize, all under the influence of the right mental set or purpose or demand."

²For other enumerations of types of reading see: MONROE, WALTER S.—"Types of Learning Required of Pupils in the Seventh and Eighth Grades and in the High School," Bureau of Educational Research Bulletin No. 7, University of

student approaches the reading of a textbook is a potent factor in determining the nature of his activity.¹ For example, if his purpose is merely to remember the more important statements of the author well enough so that he can recite them in response to questions that the teacher asks, the student may not make much effort to understand what he reads. In many cases he will be satisfied with a general, hazy comprehension and will tend to confine his efforts to memorizing words, phrases, and sentences well enough to remember them until the next recitation period, or perhaps until the final examination. On the other hand, if the student's purpose is to understand, his mental processes will exhibit different characteristics. His efforts will be focused upon reviving ideas, facts, and principles, creating new ones by making inferences from the context or by consulting the dictionary, and synthesizing the elements of knowledge thus obtained into satisfactory meanings of the sentences and paragraphs.

It is obviously impossible to define sharp lines of demarcation between the purposes with which the reading of a textbook may be approached. Hence there may be some overlapping between the reading purposes described in the following paragraphs. Furthermore, it is probable that the

Illinois Bulletin, Vol. 19, No. 15, Urbana: University of Illinois, 1921, 16pp. GRAY, W. S.—Summary of Investigations Relating to Reading, Supplementary Educational Monographs, No. 28, Chicago: University of Chicago, 1925, pp. 16-19.

¹This hypothesis is supported by objective evidence obtained by photographing the eye-movements of readers when responding to a variety of requests to read silently. For an account of the investigation see: JUDD, C. H., and BUSWELL, G. T.—*Silent Reading: A Study of the Various Types*. Supplementary Educational Monographs, No. 23. Chicago: University of Chicago, 1922. 160 pp. See also PETERSON, JOSEPH.—“The Effect of Attitude on Immediate and Delayed Reproduction: A Class Experiment,” *Journal of Educational Psychology*, 7: 523-32, November, 1916.

actual reading purposes of students represent a variety of combinations of those enumerated here.

I. *Reading to understand*.—When reading is considered as a learning activity, it is commonly assumed that the reader's purpose is to understand, i.e., to bring into his consciousness the ideas, facts, and principles which the words and phrases of the text represent and to synthesize these elements of knowledge into the meaning of sentences and paragraphs. However, the degree of understanding may vary widely. A student may be said to understand the fact, "Washington was the first president of the United States," if he associates rather meager meanings with the terms, "Washington," "first president," and "United States," and then connects the meanings as the symbols that represent them are connected in the statement of the fact. It probably is sufficient if the meaning associated with "president" is restricted to the idea of "head" or "chief"; it is not necessary that the reader recall the various duties of the president, his term of office, his salary, and other items that are sometimes essential to the understanding of the term. On the other hand, the understanding of a logical argument or a concisely stated conclusion usually requires that the reader associate very complete and precise meanings with the words and phrases used.

II. *Reading to remember*.—"Reading to remember" may be contrasted with "reading to understand." The former does not exclude the understanding of what is read, but the reader's attention is focused upon remembering the ideas, facts, and principles in terms of the symbols used to express them. In some cases the understanding of the words, sentences, and paragraphs seen is minimized.

III. *Searching for information*.—This reading purpose exists when a student has in mind certain specific questions

and reads for the purpose of finding the answers to them, or at least of securing information or other assistance. The searching for information is frequently combined with the purposes of "reading to understand" and "reading to remember," but it may occur as a relatively separate purpose.

IV. *Critical attitude toward statements of author.*—A critical attitude is not a fault-finding attitude. It means that the reader applies certain tests to the statements of the author. He compares them with his experience and statements made by other persons; he examines them for accuracy and precision of statement; he judges them with reference to their logical sequence; he considers their implications. A critical attitude toward the statements of the author implies also the purpose of "reading to understand," but a student may endeavor to understand his text without being critical. In fact, many readers are not critical; they are prejudiced in favor of accepting what is expressed in printed form and hence read only to understand.

V. *Supplementing the text.*—The supplementing of a text may be considered an activity in addition to reading, but it may be so intimately combined with the comprehension of the printed page that a distinctive reading attitude is created. In actual reading this attitude is combined with the purpose of "reading to understand" and frequently with a critical attitude. In addition to understanding the text, the reader endeavors to assimilate the ideas, facts, and principles brought into his mind by orientating them with reference to each other and to items of knowledge previously acquired. Sometimes the supplementation takes the form of application or at least the consideration of the implications of the statements of the author. A slightly different type of supplementing occurs

when the reader attempts to fill in "gaps" in the discussion given by the author.

VI. *Analytical study of text.*—In an analytical study of a textbook, the reader usually focuses his attention upon phases of language form, such as spelling, rhetorical structure, and grammatical usage. Analytical study may also be concerned with determining meaning due to allusions and unusual forms of expression.

VII. *Reading for enjoyment.*—The purpose designated by the phrase, "reading for enjoyment," is difficult to describe. Although it is a very frequent purpose it tends to be intangible. Something of its character is suggested by saying that when one reads for enjoyment none of the other purposes dominate him. Although exceptions can be cited, a person reading for enjoyment tends to disregard those things that do not promise enjoyment. He is seldom critical; he may skip difficult words or even sentences; he is not likely to make an effort to remember; usually he reads rapidly; he seldom gives attention to matters of form. However, it appears that sometimes the reader's satisfaction is dependent upon a relatively high degree of comprehension and he may be critical or give attention to certain phases of form.

Influence of type of material upon reading purposes.—Recognition of the reading purposes described in the preceding pages suggests the question, "What factors determine a student's reading purpose in a given case?" Undoubtedly there is some influence contributed by a number of subjective factors which are commonly included under the general title of "study habits," but the nature of the material to be read and certain characteristics of the instructional procedures employed by the teacher are potent factors in determining reading purposes.

The content of textbooks may be classified under the following headings:

- I. Statements of facts.
- II. Descriptions of experiences.
- III. Records of thinking such as arguments or demonstrations of geometrical theorems and expositions.
- IV. Products of generalizing experience or other thinking expressed by words, phrases, and sentences. (Products of thought are sometimes called "abstract and general meanings".)
- V. Descriptions or expressions of feelings.
- VI. Explicit learning exercises.

These types of reading material are seldom isolated. Statements of facts and generalizations frequently appear in descriptions, and records of thinking usually include statements of facts as well as products of thinking. However, this analysis will assist us to understand the teacher's task in directing the acquiring of knowledge through reading. Most of the content of the typical high-school textbook would be classified under the first and fourth types. "Statements of facts," which make up a large portion of the content of many high-school textbooks, probably suggest "reading to remember" to many students. "Abstract and general meanings" probably have a similar influence.

The teacher's control of reading purposes.—The character of the learning exercises which a teacher asks his students to do and the tests of achievement which he employs influence the reading purposes of his students.¹ "Satisfying the requirements" of the teacher is usually

¹This is essentially the same principle as that emphasized in the chapter on Teachers' Objectives. See page 75.

the dominant immediate objective of high-school students. Hence, if the teacher asks questions that require or permit statements from the text as answers, his students will naturally emphasize "reading to remember" in their study of the textbook. If the teacher of literature asks analytical questions relative to form, his students are not likely to approach the reading of a literary selection with the purpose of enjoyment. If the teacher maintains a critical attitude toward the text and toward the responses of his students during the recitation period, they are likely to adopt a critical attitude in their reading of the text.

Although the instructional procedures that a teacher employs as well as the nature of the material to be read undoubtedly influence the reading purposes of his students, these factors do not determine them. Furthermore, a teacher cannot secure a given reading purpose by making a direct request for it. In the monograph referred to on page 194, Judd and Buswell make the following statements:

The general conclusion justified by an examination of the records of these twenty people is that the effect on the reading process of a call to read carefully is very different in different individuals, . . . no class can be controlled, as a class, by the demand that a passage be read carefully. . . . The fact is that students very often do not know what they are doing when they read. They encounter certain types of material and read them according to the impulse of the moment.¹

The following enumeration of the types of learning exercises and test exercises represents the pooled judgments of a number of graduate students who had given considerable thought to the teacher's control of reading purposes. However, the lists should not be accepted as final.

¹*Loc. cit.*, pp. 38-9.

I. Reading to understand¹ is encouraged by:

1. Thought questions that afford opportunities for the application of the ideas, facts, and principles expressed in the text.²
2. Requests to determine topic sentences or principal ideas and to give reasons for the selections made.
3. Requests to prepare an outline or a summary.
4. Requests to read for purpose of explaining text to the class or to some other audience.
5. Requests to determine author's purpose or problem.
6. Requests to draw an illustrative diagram or map.
7. Requests to prepare a list of questions that the text answers.

II. Reading to remember is encouraged by:

A. *Learning exercises*

1. Questions that are explicitly answered by the text.
2. Requests to prepare for a debate or discussion of a specified topic.
3. Requests to underline or check statements judged to be important.

B. *Test exercises*

1. Requests to reproduce the text read, either in free expression or in response to specific questions such as: What does the author say about . . . ? Discuss . . . (a topic discussed in text).
2. True-false, completion, multiple-choice, and most other kinds of "new examinations."
3. Requests to summarize or outline the text from memory.

¹It is assumed that the material to be read is suitable for the purpose of "reading to understand." A corresponding assumption is made in connection with each of the following lists.

²Several of the types of learning exercises also fulfill a testing function. This is especially true of thought questions that afford opportunities for the application of the ideas, facts, and principles expressed in the text.

III. Searching for information¹ is encouraged by:

1. Requests to prepare reports on specified topics.
2. Questions that are answered by the text although not explicitly stated by the author.
3. Questions requiring the collecting of information as a basis for a judgment such as: Is the author unprejudiced in his discussion? What is the author's attitude toward. . . ?
4. Request to complete a skeleton outline, especially when the items must be secured from different sources.

IV. Reading with a critical attitude is encouraged by:

1. Thought questions such as: Is the author consistent? Is he justified in his statement? Would the author agree with. . . ?
2. Requests to compare events, persons, etc.
3. Requests to compare two or more texts.
4. Requests to evaluate portions of a text.
5. Requests to compare author's view with student's experiences and beliefs.
6. Requests to explain meaning of words, phrases, or sentences as used by author. (Usually employed as test exercises.)

V. Supplementing the reading of a text² is encouraged by:

1. Requests to prepare an explanation of statements in text.
2. Requests to prepare illustrations of statements in text.
3. Requests to supply reasons for statements by author or to fill in other gaps in his trend of thought.

¹This purpose may be combined with either reading to understand or reading to remember. The purpose of "searching for information" does not appear to be influenced greatly by the character of the test exercises.

²This purpose is usually combined with "reading to understand" or "a critical attitude."

4. Requests to determine implications or consequences of statements by author.

VI. Analytical study of text is encouraged by:

1. Requests to determine how emphasis is secured.
2. Requests to note choice of words (diction) and sentence structure.
3. Requests to compare the style of one author with that of another.
4. Requests to identify or to prepare lists of figures of speech, or other items of form.
5. Requests to correct errors. (This assumes that errors exist in the text.)
6. Requests to determine the origin of words.

VII. Reading for enjoyment is encouraged by:

1. Requests to select a story or book which the student enjoys and which he thinks the other members of the class would enjoy.
2. Inquiries concerning characters or portions of material read which were enjoyed most.
3. Requests to make out a list of books to recommend to other students or to adults.

Reading purposes essential for efficient study of textbooks.—Recognition of a number of reading purposes raises the question, what purpose or combination of purposes is essential for efficient study of textbooks. A student's reading purpose should vary with the immediate objectives and to some extent with the nature of the material to be read, but usually "reading to understand" should be the dominating element. Sometimes this purpose should be supplemented by "reading to remember," at other times it should be combined with a "critical attitude." Frequently the student should endeavor to "supplement the text." When the student is "searching for

information" pertaining to particular questions or topics, "reading to understand" will naturally be subordinate, at least until promising sentences or paragraphs have been located. "Analytical study" should not be included in the reading purposes of high-school students except as an incidental or subordinate factor. In the case of literary selections, the reading purpose frequently should be what has been described as "reading for enjoyment." However, some comprehension is a necessary prerequisite for enjoyment. Hence "reading to understand" should be combined with "reading for enjoyment."

Training in the elementary school inadequate for the reading required in high school.—Training in silent reading is emphasized in the elementary school; and frequently the assertion is made that by the time a child completes the sixth grade he is expected to have mastered the technique of silent reading so that he can use it as a tool in the study of geography, history, literature, mathematics, physics, chemistry, etc. However, the high-school teacher who proceeds on the assumption that his students are able to read the texts and other books commonly used will find that the assumption is not justified. In the first place, the results of standardized tests show that many children who are poor readers are being promoted from the sixth grade, or even from the eighth grade. A few have not acquired good eye-movement habits and others read slowly for other reasons. A large number fail to read accurately. Although in time the elementary school may increase the quality of its product, it must be admitted that the high school now receives many poor readers and probably will continue to receive several, who because of deficiency in the general technique of silent reading are unable to study textbooks effectively.

The second fact is that the reading of high-school textbooks is difficult. The significance of this statement becomes more apparent when we know that these texts include a large number of words which are not found in Thorndike's list¹ of the ten thousand most frequently used words. In physics, chemistry, biology, history, economics, and other subjects the high-school student will encounter a large number of new technical words and phrases with which he must associate precise meanings. In the preceding chapters of this text the reader has encountered such terms as educational objectives, ultimate objectives, immediate objectives, learning exercises, subject-matter, knowledge, controls of conduct, and motive. Your experience with these terms furnishes a basis for appreciating the task that the high-school student faces in reading his textbooks in which many of the terms probably are more abstract to him than those used in this text are to the typical college junior or senior.²

¹THORNDIKE, E. L.—*The Teacher's Word Book*. New York: Teachers College, Columbia University, 1921, 134 pp. For the account of the derivation of this list see: THORNDIKE, E. L.—"Word Knowledge in the Elementary School," *Teachers College Record*, 22:334-70, September, 1921. See also, CURTIS, FRANCIS DAY.—"Some Values Derived from Extensive Reading of General Science." Teachers College, Columbia University, Contributions to Education, No. 163. New York: Bureau of Publications, 1924, p. 20. See also the articles by S. R. POWERS given on page 205.

It may seem that one who knew the ten thousand words in Thorndike's List would be well equipped for reading. It appears that a person needs to know many words not included. An analysis of 630 articles in newspapers revealed 962 scientific terms, only 35 per cent of which are found in Thorndike's List.

²In an attempt to ascertain children's understanding of such words and phrases as socialist, big business, an industrial country, wage earner, standard of living, conservation of natural resources, aristocracy, and foreign trade, a number of high-school students were asked in an oral interview to tell what the terms meant to them. A total of 112 high-school students taken from grades nine to twelve were interviewed relative to 31 terms taken from the field of the social sciences. No student made a perfect score and the median was approximately 38 per cent. See MELTZER, HYMAN.—"Children's Social Concepts," Teachers

Abstract and general meanings have been derived from experience by reflective thinking; but when the student meets the symbols used for expressing them, he often finds little or nothing to suggest the basic experiences. The meanings have been abstracted or removed from their source and all traces obliterated. Certain aspects of a large number of experiences have been condensed and labeled with a single word. The learner's task is to supply the experiences necessary to understand the words and phrases which he encounters in his reading and to make the connection between these experiences and the symbols used in expressing the abstract and general meanings. Bright students, if they possess a sufficiently strong motive, are able to overcome the handicap of an inadequate technical vocabulary through the use of a dictionary and of other sources of information, but many students will require specific vocabulary training before they will be able to read the textbook assignments. In addition to technical terms, textbooks include many figures of speech, idiomatic expressions, and abstract terms. Literary and historical allusions are frequently encountered. Finally the difficulty of the task of reading is made more difficult by long and involved sentences.

The technical vocabularies of high-school subjects.—
In a recent investigation¹ readers were assigned a textbook

College, Columbia University, Contributions to Education, No. 192. New York: Bureau of Publications, 1925, p. 48.

¹PRESSEY, LUELLA COLE.—“The Determination of the Technical Vocabulary of the School Subjects,” *School and Society*, 20: 91-96, July 19, 1924. Additional evidence of the vocabulary difficulties that high-school students encounter is supplied by the following references: POWERS, S. R.—“The Vocabularies of High-School Science Textbooks,” *Teachers College Record*, 26:368-82, January, 1925. POWERS, S. R.—“A Vocabulary of Scientific Terms for High-School Students,” *Teachers College Record*, 28:220-45, November, 1926.

In the second of these articles a list of 1,828 “important” words is given.

with the instructions, "Read through the whole book and copy down all the words which you think a child might have difficulty in understanding." After this work had been carried to the point where it appeared that no new words would be discovered, those which seemed unimportant were eliminated from the lists. A distinction was made between those which are considered essential and those which were classified as "accessory," i.e., desirable but not essential. For several high-school subjects, the number of words remaining are given below:

	<i>Essential</i>	<i>Accessory</i>	<i>Total</i>
Algebra	151	116	267
Geometry	196	184	380
Literature	306	509	815
Common science vocabulary ¹	191	24	215
General science	916	648	1564
Biology	675	677	1352
Chemistry	765	488	1253
Physics	709	331	1040
History	542	503	1045
Home economics	1189	433	1622

Although the results of this investigation represent only the judgments of the readers assigned to examine the textbooks, it furnishes an indication of the extent of the vocabulary difficulties that high-school students encounter.

Evidence of unsatisfactory comprehension.—A recent investigation² furnishes some striking evidence of the difficulty of the material students are asked to read. Para-

¹"Common science vocabulary" includes words which are common to two or more divisions of science.

²AYER, ADELAIDE M.—"Some Difficulties in Elementary School History." Teachers College, Columbia University, Contributions to Education, No. 212. New York: Bureau of Publications, 1926, 70 pp.

graphs were selected from typical history texts used in the fifth grade and tests based on them were given to typical groups in the fifth and seventh grades. In her conclusions the investigator states that "the results of these tests showed an astonishing inability on the part of both fifth- and seventh-grade pupils to comprehend fifth-grade history paragraphs." The meaning of this "astonishing inability" is described by pointing out that according to the data secured, pupils possessing average sixth-grade reading ability, as measured by the Thorndike-McCall Reading Scale, attained only 25 per cent comprehension of the paragraphs from the fifth-grade histories; pupils possessing average seventh-grade ability attained 50 per cent comprehension; pupils possessing average tenth-grade ability attained 75 per cent comprehension; and pupils possessing ability equivalent to average college sophomores attained 93 per cent comprehension.

Another investigation¹ furnishes information concerning the ability of ninth-grade students to comprehend typical literary selections. In measuring the reading ability called "literary comprehension," the student was furnished with a copy of the selection to be read, and with the text before him, he was asked to respond to five tests based on it:

Test 1. Reading Comprehension (broad), in which the student was asked to check in a list of statements the ones that seemed to represent the most important conclusions in the selection and also the ones that seemed to represent the most important points made by the author in the "development of the thought of the story";

Test 2. Fact Comprehension, which consisted of ten fact ques-

¹IRION, THEO. W. H.—"Comprehension Difficulties of Ninth Grade Students in the Study of Literature." Teachers College, Columbia University, Contributions to Education, No. 189. New York: Bureau of Publications, 1925, 116 pp.

- tions each of which was to be answered by checking the best answer in a list of five statements;
- Test 3. Expression Comprehension, which consisted of ten expressions taken from the selection and asked the student to check in given lists the statements that seemed to be the best explanation of each expression;
- Test 4. Word Knowledge, which asked the student to indicate the meaning of twenty words taken from the selection by checking in a list following each word the word or expression "which means most nearly what the first word of that line means, as used in this story";
- Test 5. General Information, which consisted of twenty questions concerning biography, history, geography, and so forth. The information tested may be described as forming the background of the selection.

Four such series of tests were given to 170 representative ninth-grade students. The investigator states the following conclusion:

The average reading comprehension as compared with the total reading comprehension possibilities of the selections used is so mediocre that it is very hazardous to proceed on the assumption that students in the ninth grade can read well enough to comprehend and appreciate literature by merely reading.¹

In their report of a study of various types of reading Judd and Buswell² make the following statements:

It is safe to say that in the minds of most students the expectation of questions does not lead to any well-ordered plan of attack on the content of the passage read. . . . Even when students are fully aware of the necessity of preparing for questions, they usually do not know what to do. . . . one cannot escape the conviction that pupils have been left to work out their own de-

¹*Ibid.*, pp. 71-72.

²JUDD, C. H., and BUSWELL, G. T.—*Silent Reading: A Study of the Various Types*. Supplementary Educational Monographs, No. 23. Chicago: University of Chicago, 1922, pp. 44-45.

vices of meeting the demands imposed on them in preparing their lessons through reading.

The results of these investigations should convince one that, in general, high-school students are not equipped to do the reading required of them. This conclusion applies to students in the eleventh and twelfth grades as well as to those in the junior high school. In fact, it is probably true that a majority of college students, at least in the first two years, are very poor readers.¹

In directing the reading of textbooks, the high-school teacher has a dual problem.—In directing the reading of textbooks, the high-school teacher is immediately concerned with getting his students to acquire certain items of knowledge, but it is apparent that he is also responsible for training his students to be skilful in doing the reading that he asks them to do. This means that the teacher should endeavor to train his students to be proficient in doing the various types of reading exercises which he assigns. The high-school teacher must not assume that the elementary school has produced competent readers. Some will not have acquired good eye-movement habits and

¹Although accepting the conclusion that high-school students are poor readers and recognizing that a rather large technical vocabulary is inevitable, it is pertinent to ask whether the reading of textbooks is unnecessarily difficult. An investigation based on passages taken from fifth-grade histories indicated that "reading comprehension is blocked to a great extent by difficulties unessential to history, especially figurative language and abstract words." AYER, ADELAIDE M.—"Some Difficulties in Elementary School History," Teachers College, Columbia University, Contributions to Education, No. 212. New York, Bureau of Publications, 1926, p. 48.

It is not unlikely that a similar investigation of high-school texts would furnish evidence for a similar conclusion relative to them. On the other hand, an important phase of the objectives of such subjects as history, physics, and botany is the learning of the technical terms needed for the consideration of the topics studied. Any attempt to simplify textbooks by eliminating essential technical terms would be unfortunate.

other essential mechanical elements. Relatively few will have learned what general procedure to follow in the case of a given reading purpose. The deficiencies in vocabulary will usually be greater than the technical vocabulary of the subject being studied. Except when the material is relatively simple, many students will be lacking in power to synthesize the meaning of words and phrases in comprehending sentences and paragraphs. Hence the teacher should explicitly recognize his responsibility for providing such supplementary training as is needed by his students.

If the students are deficient in some of the mechanics of silent reading, he should not hesitate to employ learning exercises designed to improve their reading mechanism.¹ There will usually be need for instruction to engender power to comprehend sentences and paragraphs, and vocabulary training should be regarded as an essential phase of the teaching of any subject. Unless the students have had considerable experience in doing the types of reading which they will be asked to do, the teacher should realize that he needs to instruct his students in regard to the general procedure to follow. In any case it will usually be profitable to devote considerable time during the first weeks of the course to exercises explicitly designed to provide training in reading the textbook.

It is likely that failure to train students to do the reading they are asked to do will encourage undesirable study habits. In the investigation relating to the reading of paragraphs taken from fifth-grade histories (see page 207) the investigator noted that when pupils were given a free expression test, i.e., asked to tell what they had read, "fifth-

¹An excellent discussion of exercises designed to produce skilful readers is given by PARKER, S. C.—*Types of Elementary Teaching and Learning*. Boston: Ginn and Company, 1923, pp. 351-94.

grade pupils more often omit what they do not understand whereas the seventh-grade children more often repeat verbatim the words of the author." Since it was found that on the average seventh-grade pupils comprehended only about 50 per cent of the paragraphs, one is probably justified in assuming that a verbatim repetition of the words of the author does not represent clear ideas. Hence as a result of the instruction they have received, seventh-grade students exhibit less inclination to admit the fact when they do not know, and more of a tendency to "bluff" by repeating knowledge symbols whose meaning is vague.

Learning exercises.—There are two general types of learning exercises which call for reading: first, explicit requests to read or study certain pages of a textbook, and second, questions and other exercises to be answered by reading. In the case of explicit requests to read, the nature of the resulting learning activity will vary with the type of material to be read. In the case of narrative or description, the request is to experience vicariously. When records of thinking are to be read the request is to trace the thinking of the author. When the material consists of products of thought the request calls for comprehending them. The second general type of learning exercise includes questions which can be explicitly answered by the textbook and those for which the text merely provides data.

Assignments in the form of direct requests to "study" or "read" certain pages of a text have been severely criticized. It is asserted that such exercises are too general and indefinite and tend to encourage "reading to remember." It is contended that questions and other exercises which call for reading as a means will lead to much more effective learning activity. However, if the teacher regularly dictates a series of detailed questions which his students are

to answer, they are likely to become dependent upon such exercises and to fail to acquire initiative and independence as learners.¹ Hence the teacher should endeavor to engender a concept of what it means to "study" a textbook. Students should be trained so that a request to "study" certain pages of a text will have an appropriate meaning to them.

When requesting the reading of products of thinking, the teacher may direct the attention of his students to certain words, phrases, and sentences which express important items of knowledge and may request them to prepare an explanation of these terms or to recall illustrations of them. Frequently it is desirable to put the request in the form of a question: "What does the author mean by . . . ?"

As a rule comprehensive questions or problems are more desirable as learning exercises than detailed questions which are explicitly answered by the text. In many cases exercises of the latter type result in the reading of a textbook degenerating into a search for facts or statements which are likely to be isolated. A problem or a comprehensive question provides a basis for reflective thinking. It is necessary for the student to search for facts but he must also compare, evaluate, and organize them.

An important phase of the teacher's problem in devising learning exercises relates to the amount of material which students should be asked to read. It is a very common practice to require a considerable amount of collateral reading in addition to the study of the basic text. When students are asked to read one hundred pages on a given topic it is obvious that they cannot study the material as intensively as an assignment of ten pages, unless they devote much more time to the task. Hence the question is raised,

¹This point is discussed more fully in Chapter XIII.

What are the relative merits of "intensive reading" and "extensive reading?" It appears that the answer depends upon the difficulty of the material to be read, the reading ability of the students, and their familiarity with the topics considered. One investigation¹ indicated a superiority for extensive reading except when achievement was measured by a reproduction test. However, the conditions of this investigation were such that a teacher should exercise caution in applying the conclusions to assignments in history, general science, and similar subjects. The amount of reading assigned should not be so great that students have no time to think about what they read or to engage in other learning activities which supplement reading.

Requests to prepare an outline or summary.—Requests to prepare an outline or a summary of a reading assignment are frequently employed as learning exercises. They furnish a basis for activity that tends to supplement the reading of the text. In order to be most effective a request to prepare an outline should not be interpreted as a request to abstract from the textbook what appears to have been the author's outline. Instead the student should endeavor to outline his own understanding of the assignment read. He should determine what are the principal points and what are the subordinate ones. Furthermore, unless there has been an explicit assignment to outline a section of the textbook, he should not be confined to what he has learned as a result of his reading. The purpose to be accomplished in the preparation of an outline is to get the student to relate, evaluate, and organize what he has learned partially from his reading and partially from other sources. Since

¹GOOD, CARTER V.—"An Experimental Study of the Merits of Extensive and Intensive Reading in the Social Sciences," *School and Society*, 22:758-60, December 12, 1925.

students may and probably will differ in the knowledge which they obtain from the reading of a text, outlines of this knowledge may also differ, at least in details. Hence, the teacher should not think of there being one and only one correct outline for a given assignment. The important consideration is to get the student to evaluate and organize what is learned so that he will approach more nearly the objective of mastery.

The preparation of a summary also is a valuable learning activity. One investigation has indicated that when a test is given immediately after the reading, summarizing mentally by answering specific questions is more effective than rereading for the same length of time.¹

Comparing one textbook with another or with knowledge acquired from other sources.—When it is a feasible procedure, a request to compare the statements made by one author with the account given by another relating to the same topic is a valuable supplementary learning exercise. Ascertaining the respects in which the two authors agree and those in which they disagree will frequently lead to a more complete understanding of the text. When comparison between texts cannot be made, it will frequently be possible for the student to compare the author's statements with his own experiences and with knowledge acquired from other sources.

Motivating textbook study.—The nature of the learning exercises assigned plays an important part in the motivation of textbook study. In general a problem or a series of questions is more interesting than a direct request to study certain pages of the textbook. A problem creates a need for reading; it furnishes a definite purpose.

¹GERMANE, CHARLES E.—“The Value of the Controlled Mental Summary as a Method of Studying,” *School and Society*, 12:591-93, December 11, 1920.

The character of the material to be read is also a factor. Unfortunately some high-school texts are not well written and afford many unnecessary vocabulary difficulties. Frequently the teacher may overcome the handicap of the adopted textbook by assigning the reading of appropriate collateral material. He may also give some assistance with anticipated vocabulary difficulties when the assignment is made.

The occasional use of a standardized silent reading test or even informal tests to measure rate of reading is often effective in stimulating an interest in improving ability to read. Students may be asked to measure their rate of reading when studying a textbook by noting the number of minutes used in reading five pages.

The process of textbook study.—Preparatory to considering what instructional procedures a teacher should employ in directing reading as a learning activity, it will be helpful to note certain things concerning the process of textbook study. When a student reads a description of an experience, he is experiencing vicariously; when he reads a record of thinking, he is tracing the thinking of another; when he reads “new” words, phrases, and sentences, he is comprehending the products of thought.

Vicarious experiencing through reading cannot be a passive process. The reader must reëxperience the experience recorded in the text. He should seek to determine the what, when, where, and how; he should endeavor to build up clear and, in some cases, detailed mental pictures of the person, scene, thing, or event described. The student’s immediate objective can be described in more tangible terms by saying that he should endeavor to acquire the ability to describe the experience about which he has read. This description may be given in his own words or may

include remembered statements of the author, but in either case the student should understand what he is able to tell. Some teachers have found it effective to have their students reconstruct an experience by dramatizing the action, building a model, or drawing a diagram to represent the scene or object described.

"Tracing the thinking of another person" suggests a passive process. However, this type of reading cannot be passive if it is to function as a learning activity. The reader must be active mentally. Any tendency toward inactivity means a decrease in the effectiveness of the reading as a learning activity. Since the writer presents the ideas and lays out the "paths of thinking," it is very easy for the reader to become passive. The situation is similar to the visit of a tourist in a strange city under the direction of a competent guide. If he merely follows this guide, he will learn very little about the geography of the city, and later, if unaided, he will probably be unable to find his way about. On the other hand, if this tourist studies a map of the city, notices landmarks and pays attention to the route over which he is guided, he probably will be able to retrace the route without a guide, or to serve as a guide for another tourist. In reading a record of thinking the student is the tourist and the author an expert guide. If the student is merely a follower, he will learn little from the reading of the textbook. He will not be able to retrace the thinking about the topic.

In tracing the thinking recorded by a writer, the reader should have for his objective not only an understanding of the conclusion but also of the reasoning by which it has been reached. He should seek constantly to answer such questions as: "Why is this statement made?"; "Is it justified?" The tracing process is not effective as a learning

activity unless the reader understands the reasons for the various statements made by the writer and reproduces in his own mind at least the essentials of reflective thinking recorded in the text. This reflective thinking begins with a clear understanding of the problem being considered and continues through the several steps until the final conclusion is reached.¹ Throughout the tracing process the reader should maintain a critical attitude, comparing the statements of the writer with his own experience and knowledge gained in other ways. Sometimes it is necessary for him to fill in "gaps" in the writer's thinking. If the tracing of thinking has been well done, the reader will know why the conclusion should be accepted.

In seeking to understand generalizations which are expressed by words, phrases, and sentences, the reader is concerned with ascertaining what the statements mean rather than with reproducing thinking by which the conclusions that they represent were reached. The question uppermost in his mind should be "What does this statement mean?" rather than "What is its justification?" He should endeavor to recall illustrations from his experience. It is necessary that he give careful attention to details because frequently a single word may be crucial in determining the meaning of a concisely worded statement. It is in reading this type of material that a dictionary is most serviceable. Coupled with the objective of understanding there should also be that of "mastery."

A definition of a skilful reader.—Lyman² has defined a skilful reader as follows:

¹See page 168 for a description of the process of reflective thinking.

²LYMAN, R. L.—"The Teaching of Assimilative Reading in the Junior High School," *School Review*, 28:600-10, October, 1920.

1. Reads with a definite purpose, a problem, in mind.
2. Grasps the author's point of view and central theme.
3. Lays hold of the order and arrangement of the author's ideas.
4. Pauses occasionally for summarizing and repeating.
5. Constantly asks questions of his reading.
6. Continually supplements from his own mental stock.
7. Evaluates the worth of what he reads.
8. Varies the rate of his progress through the reading.
9. Ties up what he reads with problems of his own.

Variations in process of reading on basis of rate.—The phrases “rapid reading” and “careful reading” are used as designations of two general types of reading. Most authorities recommend that a student read through a textbook assignment or a division of it rapidly in order to pick out the principal points and to become acquainted with the author's general trend of thought. In this preliminary survey the student should read at the rate of from 300 to 400 words per minute. He may read even more rapidly if the textbook is well organized and if paragraph headings have been used. Scientific investigations have failed to support the belief that rapid reading is incompatible with a high degree of comprehension; they show, rather, that a reasonably rapid rate of reading is likely to be accompanied by a high degree of comprehension.

This rapid reading of an assignment should not be done carelessly. Students may be instructed to “skip” or pass over a limited number of words and phrases which they do not fully comprehend, particularly in reading narrative or description, but they should constantly endeavor to understand. The purpose of this rule is to guard against distracting interruptions and delays occasioned by looking up the meaning of words in a dictionary or by associating

and comparing the text with previous experiences or other knowledge.

"Rapid reading" implies that it should be followed by a more detailed and thorough reading of the assignment. In this learning activity definite and precise meanings are determined for the various words and phrases, and these elements of meaning are then combined through association, comparison, and organization to form the larger meanings expressed by sentences and paragraphs. In "careful reading" the student's attitude should be critical.

The value of rereading.—The first law of learning (on page 38) states that "if other factors affecting learning remain unchanged, the strength of a modifiable connection between a situation and a response is strengthened as it is exercised." In conformity with this law, students are advised to reread, and frequently they are urged to review, the assignment just before the class period. This advice is supported by some experimental evidence. For example, in a recent investigation¹ it was found that when tested immediately after a single reading of an article, the average student recalled less than half of the ideas and many recalled only a third or less. After twenty or thirty days have elapsed, the effect of a single reading will approach zero unless the material is very interesting or striking. Another investigator² reports the comparative effect of a single reading and two readings. Measurement of the outcomes by means of an information test shows

¹YOAKAM, GERALD ALAN.—"The Effects of a Single Reading." University of Iowa Studies in Education, Vol. II, No. 7. Series No. 77, March 15, 1924. Iowa City: Iowa State University, 100 pp.

²GOOD, CARTER V.—"The Effect of a Single Reading Versus Two Readings of a Given Body of Material." *The Journal of Educational Method*, 5:325-29, April, 1926.

that the two readings were "definitely more effective" than the single reading.

Although usually high-school students should be urged to reread assignments, the teacher should consider the possibility of other learning activities affording a more effective supplement after the material has been read carefully once. For example, in history it may be more effective to ask that a parallel reference be read or to assign exercises designed to supplement reading.¹

When a student rereads an assignment he should not confine his efforts to an attempt to memorize the text. His activity should involve a rethinking of the statements of the author, at least in outline. This does not mean that the teacher should discourage the memorization of any of the information presented in the text. Some facts should be memorized but, as we have pointed out, the memorization of the language symbols used to record and express knowledge is not equivalent to acquiring knowledge.

Explicit training in silent reading.—Several investigators have shown that the rate of reading silently can be increased by training. For example, Stone and Colvin² report that twenty hours of practice by a group of college students resulted in an increase of 74 per cent in the average rate of reading as measured by the Monroe Standardized Silent Reading Test III. At the same time the average comprehension score was increased 84 per cent. Other investigators³ have shown even greater gains. It is evident

¹See page 196.

²STONE, C. W., and COLVIN, CARL.—"How to Study as a Source of Motive in Educational Psychology," *Journal of Educational Psychology*, 11:348-54, September, 1920.

³For a brief summary of a number of studies see: GRAY, W. S.—"Summary of Investigations Relating to Reading," Supplementary Educational Monographs, Number 28. Chicago: University of Chicago, 1925, Chapter XI. O'Brien

that unless a class of high-school students have had superior training in the elementary school, the teacher can effect marked improvements in reading as a tool of learning. In fact, merely stimulating students to give attention to the technique of reading and to try to improve will frequently result in marked improvements. Huey¹ states: "I have considerably increased my own speed of reading by waking up to the fact that my rate was unnecessarily slow, and then persistently reading as fast as possible with well-concentrated attention, taking care to stop short of fatigue until the new pace was somewhat established. I thus reached a speed of a page per minute for such books as Ellis' *The Criminal*, of the Contemporary Science Series, maintaining this rate for a half-hour or so at a time."

Suggestions for learning to read rapidly.—Probably the most important thing is a strong determination to read rapidly. When attempting to train students to read rapidly the teacher should endeavor to engender an interest in this type of reading and then provide appropriate exercises for practice. A prose selection of moderate difficulty should be selected and the students directed to read it over and over again, say once a day for a week or two, keeping a record of the number of minutes and seconds required. Another type of exercise is to ask students to skim through thirty to fifty pages of a text checking all references to any appropriate general topic such as animals, trees, etc. A variation of this exercise is to skim through a chapter or a portion of one at the rate of one to two pages a minute

(O'BRIEN, J. A.—*Silent Reading*. New York: The Macmillan Company, 1921, 289 pp.) found that explicit training in silent reading for two months increased the average reading rate of pupils in grades three to eight, 110 words per minute. This was 46 words greater than the increase of a control group.

¹HUEY, E. B.—*The Psychology and Pedagogy of Reading*. New York: The Macmillan Company, 1908, p. 179.

and then attempt to write down what one remembered. When a text has a list of questions at the end of the chapters, students may be directed to skim through a chapter searching for information pertaining to certain of these exercises.

Directing reading as a learning activity.¹—The teacher's direction of reading as a learning activity begins with the procedures he employs in controlling the reading purpose of his students. (See page 198.) Additional direction is effected by giving suggestions in regard to how the reading should be done. As stated on page 218, most authorities advise teachers to direct students to read an assignment through rapidly and then reread it carefully. The appropriateness of this rule appears to depend upon the material and the student's purpose. In adult life one seldom rereads the daily paper, a story in a popular magazine, or a volume of fiction. Even material of a somewhat more abstract character frequently is not read a second time. However, much of adult reading is not efficient as a learning activity and hence should not be taken as a model for the reading of textbooks by immature high-school students. In the case of easy material the "careful reading" and the "rapid reading" may be combined in a single process. Although there is less necessity for a careful reading of description and narrative than in the case of exposition or argumentation, when a lasting and detailed vicarious experience is desired, it will usually be necessary to supplement the first reading.

Comprehending the product of another's thinking is a

¹This topic is considered again from a slightly different point of view in Chapter XIII under the head of "Directing Learning outside of the Recitation Period." It will be helpful to refer to that chapter in connection with the study of the topic here. An excellent supplementary reference for this topic is LYMAN, R. L.—*The Mind at Work in Studying, Thinking, and Reading*. Chicago: Scott, Foresman and Company, 1924, pp. 149-227.

“short cut” in learning which results in great economy of time for the learner but frequently it is a difficult task. After he has associated meanings with the terms used by the author, he should reread each paragraph carefully, seeking to make the ideas, facts, and principles a part of his mental equipment. Frequently more than one careful rereading is necessary. “Mastery” will seldom be attained without engaging in supplementary learning activities which afford opportunity to apply the knowledge acquired through reading. In the absence of problems that afford opportunities for application, the teacher may suggest that the student attempt to express the author’s ideas in his own words. This is most effective when it is done in writing.

A very valuable type of direction may be given in connection with words and phrases which the teacher anticipates will be difficult for his students to comprehend. He may explain or illustrate them in making the assignment. This procedure may be varied by asking a member of the class to give the explanation or illustration when there is one who can do so. However, the teacher should avoid encouraging his students to depend upon having all difficulties explained when the assignment is made. Frequently it is advisable for the teacher to do nothing more than call the attention of the class to anticipated difficulties, possibly by asking specific questions. This practice will tend to cause the students to feel a greater responsibility for determining meanings for themselves.

Many teachers are accustomed to recommend that students underline or check in the margin words, phrases, and sentences which express important ideas, facts, and principles.¹ This procedure tends to make reading a more

¹This practice should be followed only when the student is reading books he owns.

effective process because the student must evaluate what he reads in deciding what to underline. Furthermore, the presence of the marks placed in the text are of assistance when it is reread.

In underlining or otherwise marking a textbook, the student should label only the most important expressions. If he should underline all of the text, the result would be the same as no marking and nothing would stand out; or if he should be reckless in his underlining and carelessly mark expressions here and there, undue weight would be given unimportant details and the result be worse than if no marking had been attempted. The purpose of underlining is to give distinction to those expressions which the reader judges to possess special significance. In order that a much-soiled and disfigured text be avoided, it is advisable to reserve underlining for those expressions which are judged to be highly important. In labeling less important expressions a reader may place a check mark in the margin or in marking several consecutive lines of the text, a vertical line in the margin may be used.

When a reader has acquired "new" ideas, facts, or principles which have been suggested by the words of the text, frequently he is helped by recording this new knowledge. Failure to do so may result in its being lost. In general, a student's notes on the reading of his textbook should constitute a record of knowledge he has acquired rather than a few symbols to serve as cues for recalling expressions used by the author. Exceptions to this rule are justified when it is desirable to record the exact language of the author. In such cases students should be trained to use quotation marks. Such notes should be limited to essentials. A voluminous notebook is likely to be a sign of little learning.

The teacher should not neglect the form in which notes are recorded. In the case of supplementary assignments in reference texts, they usually should be written on cards of some standard size, 3" by 5" or 4 " by 6", or in a looseleaf notebook. The use of quotation marks has already been referred to. It is also advisable to insist upon a correct bibliographical form for the name of the author, the title of the textbook, and the other items of information which should be given in regard to the source of the quotation.¹

An excellent general rule is that a student should spend as much time in thinking about what he has read as in the act of reading. In order to stimulate this thinking the teacher may assign supplementary learning exercises in the form of thought questions or of problems which involve an application of the knowledge acquired from the reading. Frequently a portion of the recitation period should be devoted to the consideration of such learning exercises, but it is difficult to secure independent thinking on the part of all members of the class. Furthermore, real thinking requires time for reflection. Hence, a large part of the thinking which a student should do about what he has been reading must be done as a part of his preparation.

General directions and suggestions to be given students in connection with reading assignments.—For the purpose of assisting the reader of the preceding discussion of directing reading as a learning activity, lists of directions and suggestions have been prepared for the first four of the reading purposes described on pages (193-97). The lists given here represent the pooled judgments of a group of graduate students after studying the problem of directing reading as

¹Publishers and other authorities differ in regard to some of the details of the form of bibliographical references but all agree that consistency is desirable. The form of the references in this text may be taken as a satisfactory model.

a learning activity. There is some overlapping but this is to be expected since the reading purposes tend to overlap.

I. DIRECTIONS AND SUGGESTIONS TO BE GIVEN STUDENTS IN CONNECTION WITH THE ASSIGNMENT OF LEARNING EXERCISES THAT REQUIRE READING TO UNDERSTAND.

1. Read the text rapidly for the purpose of finding out the author's main thought and the general trend of the text. In doing this it will be helpful to note chapter title, center headings, and paragraph headings.
2. After the rapid first reading, reread the text carefully. Endeavor to associate clear, precise, and accurate ideas with the words and phrases of the text. Consult a dictionary and reference books when you are not certain of the meaning. Mark any passages that you are unable to understand and come back to them later.
3. Make an outline showing the principal points and the subordinate ideas.
4. Call to mind experiences that explain or illustrate statements by the author.
5. Stop occasionally as you read carefully and summarize mentally the paragraphs just read. Supplement the act of reading by thinking about what you read.
6. Express the author's ideas in your own words. It will be most helpful to do this in writing. A good plan is to write out a brief summary statement for each paragraph as it is read carefully and then combine these statements into a summary of the assigned material.
7. When appropriate, draw a map or diagram to represent the description in the text.
8. After the rereading is completed, refer to the assignment to ascertain if all exercises have been completed. If not, go over the text again.
9. Make a list of the questions which the text answers or which the text would assist in answering.

10. If you experience difficulty in understanding statements of the author, read them aloud, attempting to express the meaning.

II. DIRECTIONS AND SUGGESTIONS TO BE GIVEN STUDENTS IN CONNECTION WITH THE ASSIGNMENT OF LEARNING EXERCISES THAT REQUIRE READING TO REMEMBER.

1. Approach the reading of the text with a strong determination to remember and retain that determination throughout.
2. Read the text rapidly for the purpose of ascertaining the author's main thought and the general trend of the text. In doing this it will be helpful to note chapter title, center headings, and paragraph headings.
3. After the rapid preliminary survey, reread the text carefully. Endeavor to associate clear, precise, and accurate ideas with the words and phrases of the text. Consult a dictionary and reference books when you are not certain of the meaning.
4. As you read carefully, underline the words, phrases, and sentences you consider most important. (This rule applies only when the student owns the book. When he does not, the following rule should be substituted.)
5. As you read carefully, make a memorandum of the ideas, facts, and principles which you consider important. As a rule, copy complete sentences and check your notes to insure accuracy.
6. If the material to be remembered is extensive or complex, make an outline of it and memorize the outline.
7. Locate a few key words or phrases which will assist in recalling the entire selection.
8. After the careful reading has been completed, close the book and try to recall the essential ideas. Then read the text again to ascertain how accurately you have recalled the text. Repeat this process until you can easily recall the essential ideas, facts, and principles and arrange them in their proper relation to each other. If time permits, write out a summary of the

essential ideas. If possible, review the assignment before the class period.

III. DIRECTIONS AND SUGGESTIONS TO BE GIVEN STUDENTS IN CONNECTION WITH THE ASSIGNMENT OF LEARNING EXERCISES THAT REQUIRE SEARCHING FOR INFORMATION PERTAINING TO PARTICULAR QUESTIONS, PROBLEMS, OR TOPICS.

1. Go over the question you are trying to answer until you are certain you know just what information is needed. If the assignment is not in the form of specific questions, formulate appropriate questions before you begin reading.
2. If the information called for by the assignment is commonly indicated by a word or phrase, consult the index at the back of the book. If there is no index, try the table of contents. Perhaps a chapter heading will indicate that the information you want is to be found there; if so, turn to that chapter and run through the topic or marginal headings.
3. If the data you are searching for are specific, that is, if they will appear in a form that needs no piecing together, no re-arranging, no interpreting on your part, you can run along the page very rapidly. Don't inspect every word; sweep through the printed matter searching for what you want.
4. Be certain that the information relates to your question or topic. Then make a memorandum of it, noting the title of the reference and the page.
5. If data you are searching for are general in scope, read through rather rapidly once, trying to get the meaning of the whole. Then reread rather carefully so that you can make your comparisons, draw your conclusions, interpret your results or whatever is necessary to get the information you are seeking.
6. Work as if you had only a very short time in which to obtain the information. Waste no time trying to remember what you read until you have found the required information.

IV. DIRECTIONS AND SUGGESTIONS TO BE GIVEN STUDENTS IN CONNECTION WITH THE ASSIGNMENT OF LEARNING EXERCISES THAT REQUIRE CRITICAL READING.¹

1. Read carefully a paragraph or an appropriate small unit of the text; then pause and evaluate the ideas derived from it, comparing them with your experience and ideas acquired in previous study. Note points of both agreement and disagreement.
2. Do not allow yourself to be influenced by prejudices; be openminded and fair. Critical reading is not fault finding. Try to determine merits as well as faults. Do not be hasty in drawing conclusions.
3. Locate the author's central ideas and underscore the words that express them. Write comments in the margin.
4. Express the author's ideas in your own words; then compare your statement with his.
5. Apply these tests to the author's statements:
 - a. Is his reasoning logical?
 - b. Are his statements consistent?
 - c. Has he omitted points that should have been included?
 - d. Did the author shift his point of view?
 - e. Has he included irrelevant material?
 - f. Are there any statements lacking in clearness?
 - g. Are there any statements lacking in precision?
 - h. Are any statements ambiguous?
 - i. Is there any evidence of hasty generalizations?
 - j. Has he avoided false analogies?

Learning exercises to supplement reading.—The necessity of providing exercises to supplement reading has been mentioned in the preceding pages and will be considered in certain of the following chapters, but it may be helpful to note certain points here. The recitation period affords an

¹In addition to giving directions and suggestions the teacher may describe or demonstrate the critical reading of a passage, especially the comparing recommended in the first direction.

opportunity for stimulating several types of supplementary learning activity. One type of supplementary exercise includes thought questions and other requests to recite and students may be requested to listen to explanations and discussions by the teacher. In college teaching the second type of exercise frequently becomes a dominant instructional procedure and is commonly designated as "lecturing." The value of a request to listen to the instructor talk is determined largely by what he says and the organization of his discourse.¹ Lecturing is generally criticized as an instructional procedure but it is probable that the inefficiency of lecturing is due to the quality of what is said rather than to the procedure itself. Tracing the thinking of a speaker cannot be very educative unless his thinking is good and is described effectively. Furthermore, the starting point in thinking is a difficulty, a problem. Hence the beginning of an account of thinking should be an exposition of a problem. The instructor should endeavor to create a problem in the minds of his listeners. In many cases this can be accomplished by stating a question or series of questions. When it is possible, he should delay his discussion until the need for it is apparent.

Evaluation of the outcomes of reading.—In evaluating the study of textbooks the high-school teacher is primarily concerned with outcomes classified under the general head of knowledge. Hence his task is that of measuring ideas, facts, and principles.² As observed in the preceding chapter

¹The teacher's voice, enthusiasm, use of visual aids and other factors are also influential.

²The analysis of the knowledge outcomes of reading into ideas, facts, and principles does not appear to be very helpful in measuring the achievements of students. Although it is not possible to employ it in any precise way, the following heads would probably afford a more helpful analysis: (1) "new" ideas, (2) "old" ideas enriched and strengthened, (3) new organizations of ideas, both new and old, into "new" facts and principles, and (4) "old" organizations strengthened.

this is made difficult by the fact that the speaking or writing of words, phrases, and sentences does not constitute dependable evidence of the possession of the items of knowledge for which they are appropriate symbols. The student may have memorized the symbols without understanding them.

Several standardized tests¹ are available for measuring the general ability of high-school students to read silently. However, a critical examination of these instruments will reveal several significant limitations. The reading tasks are relatively small in comparison with typical assignments in textbooks, and the exercises probably imply the purpose of "searching for information." The testing conditions usually function as a strong motive and consequently the student's effort may not be typical of his reading of textbooks. However, high-school teachers will frequently find it helpful to administer a standardized silent reading test. A more thorough measure of ability to read can be secured by devising a series of tests such as those employed by Irion. (See page 207.)

Standardized silent reading tests measure "ability to read" rather than the "outcomes of reading textbooks" which are designated when we refer to the measurement of achievement in history, physics, and other high-school subjects. Several standardized tests have been devised for measuring achievement in the high school, but their use

¹Those most widely used include:

Haggerty Achievement Examination in Reading, Sigma 3, Yonkers, New York: World Book Company.

Monroe Standardized Silent Reading Test III, Bloomington, Illinois: Public School Publishing Company.

Stanford Achievement Test in Reading, Yonkers, New York: World Book Company.

Thorndike-McCall Reading Scale for Understanding of Sentences, New York: Bureau of Publications, Teachers College, Columbia University.

is limited and the teacher will need to make many estimates of the outcomes of reading by evaluating observable performances of his students.¹ A request to explain a statement that has been read is a very common test exercise. Although frequently not recognized, there is a very real difference between "ability to explain" and "ability to use." For example, in the first chapter of this book we stated the principle that "learning is an active process." It is likely that after reading this statement, a student will understand it in the sense that he could explain it or give cases of learning which illustrate the principle. However, one who has read the text up to this point has doubtless reached the conclusion that consistent application of this fundamental principle is not easy. To apply it in teaching is even more difficult.

A significant test of the "ability to use" items of knowledge expressed by words and phrases, is one's ability to use these symbols of knowledge correctly in discussing topics. For example, the reader of this text has not fully comprehended the meaning of such terms as "learning exercise," "learning activity," "products of thought," "knowledge," "directing learning," "development," "subject-matter," "objectives," "experiencing," "attentive repetition," etc., until he is able to use them with discrimination and precision in talking and writing about topics relating to teaching in secondary schools. Most high-school subjects have a rather extensive vocabulary which is somewhat peculiar to their respective fields, and a significant test of one's acquisition of knowledge is the degree of his ability to use this vocabulary. Failure to speak the language of a subject correctly usually means that the

¹See Chapter XVI.

student does not understand the terms used.¹ In preceding chapters the reader's attention was called to certain technical terms used in this text. One test of your understanding of the topics discussed in this book is your ability to talk or write about them, using the language of the field correctly.

The meanings which a reader associates with words or phrases vary all the way from a meager or hazy idea to a very complete and definite concept. Unfortunately, it is not easy for a student to know when he has acquired an adequate meaning. The situation is different from that which prevails in doing the type of learning exercises considered in Chapter V. Frequently, in learning specific habits a defect in performance is automatically brought to the student's attention. In reading, on the contrary, the student may fail to comprehend the author's statements and be unaware of his failure. Neither is it easy for the teacher to discover the status of the student's achievement. When abstract or general meanings are to be associated with words or phrases, a formal definition may not give a satisfactory indication of the student's achievement. Requiring the student to use the word in a sentence may not furnish reliable evidence of his understanding of the term.

There is frequent failure to give sufficient attention to the meanings of words and phrases. The assertion is frequently made that students experience difficulty in solving verbal problems in algebra, geometry, physics, and chemistry because they are poor readers. The usual inference is that the crux of the difficulty is in some defect in the

¹For an elaboration of this point see INGLIS, ALEXANDER.—*Principles of Secondary Education*. Boston: Houghton Mifflin Company, 1918, p. 429 f, especially p. 432.

mechanical phases of reading, but frequently this is not the case. The real difficulty is that the students do not possess sufficiently precise and clear meanings for the words and phrases used in the statement of the problem. The existence of this condition is not surprising when we recall that few teachers explicitly and systematically stimulate and direct students in acquiring such meanings.

The teacher must maintain high standards in evaluating achievement. Otherwise he cannot be efficient in directing the acquisition of knowledge. A teacher of typewriting who fails to detect and call attention to errors in performance would not be successful in training typists. A teacher of mathematics is criticized if he accepts, as satisfactory, work in which there are errors of calculation. A good teacher of Latin does not accept without comment an incorrect declension, conjugation, or translation. Likewise, a good teacher of history or of other subjects, in which careful reading of a textbook is a learning activity, will not be successful unless he is critical in evaluating performances and refuses to accept as satisfactory any answer to a question or any other performance which bears symptoms of imperfections.

LEARNING EXERCISES FOR THE READER

1. In your study of the preceding chapters of this text, you have been asked to define certain words. This was done to enable you to associate precise and accurate meanings with the words and to help you to a clear understanding of the text. Do you feel that your study of the words has accomplished this purpose?

2. In a university class a teacher asked a question regarding "inbreeding," and student after student failed to give a correct

answer. Upon investigation the teacher found that even though in the textbook assignment the word had been used several times, no one of these students knew its meaning. As soon as it was defined, most of the students who had failed to answer the question at once signified their desire to be given another trial, and an intelligent discussion followed. Can you recall occasions when you were unable to respond because of failure to understand the meaning of a certain word or phrase? Are you in the habit, when reading, of passing over words of which you do not know the meaning? if so, in your next study based upon careful reading, underline each word which you do not clearly understand, determine its exact meaning, and decide for yourself whether the additional expenditure of time and effort is not justified.

3. Have you ever taken a standardized test in silent reading and checked your scores with the average scores (called the norm or standard) for your grade? If you have not, make an opportunity to do so and carefully compare your performance both in rate and comprehension with the norms.

4. "The teacher should endeavor to have his students distinguish between the attainment of knowledge and the acquisition of the symbols of knowledge." Elaborate and illustrate the preceding statement.

5. Measure your rate of rapid reading by counting the number of words you read in five minutes. Measure also your rate of careful reading. Unless you already read rapidly, make a systematic effort to increase your rate of reading for a period of two weeks, and determine the amount of increase.

6. Give examples of selections or of material that would require on the reader's part: (a) picturing the experience described; (b) tracing the thinking of the writer; (c) comprehending the products of the writer's thinking.

7. Have you ever tried conscientiously to enlarge both your speaking and reading vocabulary? Palmer gives the following advice to students: "Enlarge the vocabulary. Let any one who wants to see himself grow, resolve to adopt two new words each week. It will not be long before the endless and enchanting variety of the world will begin to reveal itself in his speech, and in

his mind as well. . . . A word used three times is ours forever, and with it some phase of life which had been lacking hitherto." (PALMER, G. H.—*Self-Cultivation in English*. New York: Crowell and Company, 1897, p. 19.) Adopt this plan and try it for this semester. At the end of that time, think over its value and consider adopting it for life.

8. Are you in the habit of marking your textbooks and are you systematic in your method of marking? Select ten pages of this text and mark them in a way that is consistent with the principles discussed in this chapter.

9. From your own experience or from other sources, formulate a list of directions regarding the taking of notes, which you would think it advisable to give to a high-school class.

10. Students often, even in colleges and universities, know little about using a library. Suppose that you for the first time were sending your high-school class to consult books in the library and wished your students to obtain the maximum amount of good from their reading with a minimum expenditure of time. Discuss the procedures you would adopt.

11. An English philosopher once made two classifications of persons relative to reading. One group he designated "active readers," the other "passive readers." In the light of the discussions given in this chapter, define the two groups.

12. How do you generally "read" your assignments? Do you read through the text slowly, studying as you go; or do you first read through the entire assignment rapidly and later study details? If you are in the habit of following the first plan, give the second a fair trial in your preparation of assignments and see if you do not find it a better method.

13. "An excellent general rule is that a student should spend as much time in thinking about what he has read as in the act of reading." Check up on your "reading" and your "thinking about it" and compare the time spent on each. Upon the results of this comparison you probably will need to devise ways to increase your "thinking."

14. Prepare an outline of this chapter. Then prepare a brief of it. Compare the outline with the brief. See page 292.

15. Would exercises like the following be useful in training students to trace the thinking of a writer? Give your reasons.

Study the following paragraph for the purpose of discovering the statements on which the conclusion is based.

In describing our government as being "of the people, by the people, and for the people," Lincoln has given us an excellent definition of a democratic government. A democracy is a country where everybody has a voice in making the laws by which they are governed, i. e., it is a government "of the people, by the people." As we see from Lincoln's definition, this is not all. A democracy is also a government "for the people," i. e., it exists to benefit its citizens. For this reason, in a democracy no man must be allowed to trespass on the rights of others or to persist in actions harmful to others. Since in a democratic government every one helps to make laws not only for himself but for many others, every one should be able to make good and wise laws. In order to make laws wisely a citizen must be educated. An educated citizenry is necessary for a democratic government.

CONCLUSION: Whether their parents wish them to or not, children should be made to go to school until they are 14 years old.

Check each statement below which is needed to secure the conclusion. Do not check those statements which are irrelevant.

-1. A democratic government is the best type of government.
-2. A democratic government exists "for the people."
-3. The number of democracies is greatly increasing.
-4. In a democracy every one has a voice in making the laws.
-5. Lincoln has given us a definition which expresses all the ideas inherent in a democratic government.
-6. Those who make laws "for the people" must be educated.
-7. The United States is a democracy.

CHAPTER VIII

DIRECTING THE ACQUIRING OF KNOWLEDGE THROUGH ITS USE¹

Using knowledge a learning activity.—Using ideas, facts, and principles in solving problems is frequently thought of as a means of demonstrating what a student has learned from experiencing, developing, and reading. Although the student's performances may be utilized as a basis for evaluating his achievements, using knowledge in responding to new situations is an important learning activity. Reading which includes tracing the thinking of other persons and comprehending the products of thought is a relatively passive activity. The same thing is true of listening. Mastery is seldom attained without considerable participation in using knowledge. Hence "manufacturing responses to new situations" may be thought of as a necessary supplement to the learning activities considered in Chapters VI and VII. A teacher is not likely to be very efficient in engendering "dynamic knowledge" unless he provides a considerable number of learning exercises that call for the use of knowledge.

The problems of this chapter.—The three central problems of this chapter are:

¹In this chapter the activity of problem solving is considered primarily with reference to its knowledge outcomes. The student also acquires training in the solving of problems. The engendering of general patterns of conduct will be considered more explicitly in Chapter X.

1. What types of exercises afford an occasion for the use of knowledge?
2. What rules and suggestions may the teacher give his students?
3. How may the teacher evaluate the learning activity of problem solving and its outcomes?

In order to provide a basis for dealing with these questions, especially the second, it will be necessary to consider the nature of problem solving or reflective thinking.

General characteristics of learning exercises leading to the use of knowledge.¹—The term “problem” is used as a general name for exercises that afford occasions for the use of knowledge. The basis of a problem is a difficulty, a perplexing situation. Problems frequently arise in attempting to realize purposes. For example, each of the difficulties that a student may encounter in constructing a radio set provides a basis for a problem. The missing of a train connection in traveling may create the problem of determining the most satisfactory plan for reaching one’s destination. The observation of an object, event, or phenomenon for which one does not have a ready-made explanation may create the problem of explaining it. Dewey² cites the observation of “a long white pole, bearing a gilded ball at its tip” and “projecting nearly horizontally from the upper deck of a ferry-boat” as creating a problem in the mind of one observer. He also describes the formation of a problem resulting from the observation of the formation of bubbles in washing dishes when a tumbler was inverted on

¹Although the phrase “use of knowledge” is employed in this discussion, the writer is aware that frequently thinking is carried on in terms of symbols rather than ideas, facts, and principles. See page 153 f.

²DEWEY, JOHN.—*How We Think*. Boston: D. C. Heath and Company, 1910, p. 69.

a plate to drain. At first the bubbles appeared on the outside of the tumbler. After a few minutes they went inside. The problem was to answer the question, "Why?"

The teacher may create a problem by asking a question or by assigning other types of exercises. The reader should note that the preceding sentence states that "the teacher *may* create a problem." A problem is a personal affair. Two or more persons may have the same problem but each must experience the "perplexing situation" and personally seek the solution. Until one forms the purpose of "solving the problem," it does not constitute a difficulty for him. We commonly refer to certain lists of exercises in arithmetic, algebra, and other subjects as "problems." From the point of view of this paragraph one of these exercises is not a problem for a student until he forms the purpose of finding the answer to the question asked. As the exercises appear in the text they are only "potential problems," i.e., questions which the author of the text believed would stimulate the student to form problem purposes. The extent to which potential problems become actual problems for the members of the class is determined to a large extent by the methods of teaching. The methods of instruction employed by some teachers in subjects which are rich in potential problems are such that there is very little problem solving by the students. Other teachers make problem solving a prominent learning activity in the same subjects.

Thought questions versus fact questions.—Questions for which students are able to recall ready-made answers are commonly called "fact" or "memory" questions and those for which they must make an answer are designated as "thought" questions. The process of answering a particular question depends upon the controls of conduct possessed by the person to whom it is addressed. A question

which requires reflective thinking by a student to-day becomes a fact question for him to-morrow, provided he remembers the answer which he evolved by means of his thinking. In other words, whether the question requires thinking or the mere reciting of a remembered answer is determined by the status of the student's education rather than by any characteristics of the question itself. A thought question is a *new* question, or at least one for which the student does not remember the answer.

It should, however, be noted that a large number of questions are seldom answered by reflective thinking. In fact, some are probably never answered in this way by high-school students. For example, the answer to the question, "Who discovered America in 1492?" could scarcely be arrived at by any process of reasoning. The answer must be learned from a textbook or from other sources of information. On the other hand, the question, "Compare the early settlers of the Massachusetts Colony with those of the Virginia Colony," will usually require the recalling of facts and then comparison and evaluation. Thus the term "thought question" may be used to designate those questions which usually require reflective thinking, and "fact questions" those for which students are expected to acquire ready-made answers.

Growth of knowledge through its use.—The concept of education as a process of growth is especially significant with respect to the acquisition of knowledge. One's store of knowledge grows as he uses it as an adaptable control of conduct in overcoming difficulties. The ideas, facts, and principles used are intensified; new associations are formed, and problem solving is itself an experience which may be utilized in the development of new knowledge. The meaning of a physical tool grows as one uses it in new situations.

In a similar way the meaning of rules and principles grows as we apply them in solving problems.

Application or use represents an important learning activity in engendering dynamic knowledge. Critics of our schools frequently make the claim that teachers are successful in engendering information (memorized facts and principles), but that their students are conspicuously inefficient in using such achievements in dealing with practical questions and problems. Ideas, facts, and principles are of no value unless they can be used when an occasion arises. Furthermore, such achievements improve with use and deteriorate very rapidly if they are not used. Hence, the teacher should keep constantly in mind the necessity of providing opportunities for the use of the knowledge which students acquire.

The process of using knowledge.¹—The general plan of the mental activity involved in solving a problem was described briefly in Chapter VI, but it may be considered again as an introduction to a consideration of the procedures which the teacher should employ in directing students in this learning activity. Although problem solving is usually described in terms of some such steps or phases as the following, the reader should remember that it is not a mechanical process but is characterized by variation. These steps describe only a general plan:

1. Defining the problem.
2. Collecting data or information pertaining to the problem.
3. Forming a hypothesis or proposing a tentative solution.
4. Verifying the proposed solution.

¹See exercise 17, page 278.

The defining of a problem requires that one get clearly in mind exactly what the difficulty is. In geometry students are frequently asked to state formally, "What is given?" and "What is to be proved?" Although such a formal statement is not usually required in other fields, the answering of these questions constitutes a prerequisite step in the solving of a problem. A well-defined problem serves as a guide throughout the remainder of the process of solving it. Without a clear understanding of the conditions given and the particular question or questions to be answered, students' efforts will be aimless and consequently probably fruitless.

In many instances sufficient information relative to the problem under consideration may be recalled by the student from his past learning. When this source is inadequate, additional information may be sought through reading or through inquiry of persons, or, in some cases, data may be secured from original sources. The collecting of information frequently is a comparatively simple task, but sometimes it is difficult and requires much skill and patience on the part of the student. Because this step at times becomes very prominent in the solving of a problem, students have a tendency to consider it as completing the solution. They fail to realize that the ideas, facts, and principles which they have collected are only the raw materials out of which they are to develop their answers by formulating and verifying hypotheses.

A hypothesis is merely a proposed solution. It may be right or it may be wrong. It is a "guess" at the answer, but the skilful reasoner bases his "guesses" upon the definition of the problem and the data collected. Frequently a hypothesis occurs to the problem solver before he has completed collecting data. At other times his ingenuity may

be taxed to formulate a tentative solution even after all of the data are at hand.

The final step is testing the proposed solution. A hypothesis must be considered tentative until the student has proved it to be satisfactory. The process of verification includes comparison of the hypothesis with the conditions of the problem, with all the data collected, and with any other facts or principles which may be relevant. In case the first proposed solution is found to be unsatisfactory, another hypothesis must be made and the step of verification repeated. This procedure must be continued until a solution is discovered which will pass all of the tests that the problem solver is able to apply to it. Many students exhibit a tendency to "jump at conclusions," that is, to "accept the first hypothesis which comes into their minds." It should, however, be apparent that to omit the verification of the proposed solution is to stop before the act of problem solving is complete. An unverified hypothesis may be right, or it may be wrong. In other words, the problem may have been solved, or it may not have been.

The reader should avoid the inferences that the four phases are distinct steps, one necessarily being completed before the next is taken up. Usually they overlap. Sometimes a problem is not accurately defined until after one or more hypotheses have been made. Frequently, as stated before, hypotheses are formed before all of the data have been collected. Occasionally one of the four steps may appear to be omitted, because of the fact that the "thinker" has been able to take a "short cut."¹

Use of knowledge versus drill.—Although there is the

¹It will be helpful to read PARKER, S. C.—*Types of Elementary Teaching and Learning*. Boston: Ginn and Company, 1923, pp. 307-314. The title of these pages is "How skilful problem solvers think."

common element of repetition, the use of knowledge differs in a very significant respect from drill, which is a conspicuous characteristic of the process of acquiring specific habits. In drill, variation in stimulus and response is minimized. The purpose is to secure definite and non-variable responses to certain stimuli. Consequently learning exercises are used in which the student is asked to repeat the same response to a given stimulus until it becomes a fixed control of conduct. In the learning activity of using knowledge, the purpose is to engender an adaptable control of conduct. Hence, the learning exercises are characterized by variability of stimuli and the responses by adaptation.

The objective of students in solving assigned problems.

—In considering the objectives of solving assigned problems it is important to distinguish between obtaining correct answers to the problems assigned, and learning how to solve problems. The first of these objectives is of little or no importance in itself. In the first place, the answers to most of the problems which high-school students are asked to solve are already known so that they can seldom contribute to the accumulation of human knowledge. The student who solves one hundred problems in algebra, answers one hundred thought questions in history, or does fifty original exercises in geometry probably does not add directly to the welfare of the community or to any individual in it. Hence, the objective of major importance is "learning how to solve problems." Sometimes the attainment of this objective is described by saying that the student has acquired "power", or ability to solve problems in general. "Learning how to solve problems" does not mean acquiring the ability to reconstruct the solution of the particular problems solved; it means acquiring controls of conduct which may be used in solving other

problems. These controls of conduct consist of additions to the student's knowledge and its dynamic quality (see page 159) plus general patterns of conduct which are sometimes described as "ability to reason."

The principle that the primary purpose of problem solving in the high school is the education of students is frequently violated in practice. In many cases the assumption by both teacher and student appears to be that the appropriate objective has been attained when the correct answers have been obtained for the problems assigned. If an answer is wrong, the student's work is pronounced unsatisfactory; if it is right, he is considered to have attained the objective set for him. Colvin tells of a group of students "who had for some days handed in correct examples in factoring polynomials" but "were later unable to do examples of this type." When the teacher inquired into the reason for this condition he "found that in the case of the examples handed in correctly, the pupils had simply followed the model examples in the text in a blind fashion, not definitely understanding the process involved. Later, when these model examples were no longer before the pupils, they had no idea of the correct procedure."¹ It is apparent that the immediate objective of these students was to obtain correct answers to certain exercises rather than to learn how to factor algebraic expressions.

In algebra, geometry, and mathematical phases of other subjects, some teachers endeavor to go back of the answer and evaluate the method which a student has employed; but in the case of other types of problems (e. g., thought questions in history or science) the process of arriving at

¹COLVIN, S. S.—*An Introduction to High School Teaching*. New York: The Macmillan Company, 1917, pp. 187-88.

the correct answer is seldom given any explicit consideration by either teacher or student. Under such conditions training in the general technique of reflective thinking is really accidental. In general the teacher should be less concerned with having his students arrive at the correct answer than with the character of their thinking. In fact, it may be profitable to have them consider some questions, such as some of those relating to current events or to literature, for which there may be no single answer that can be labeled as correct.

It is not the intention of the writer to imply that the teacher should insist upon the use of a definite formula in answering thought questions such as was exploited in teaching mental arithmetic. To do so would tend to discourage reflective thinking. In thinking out the answer to a question, one frequently arrives at the final answer by a circuitous route. Several hypotheses have been considered and discarded. Little if any of the thinking by high-school students normally proceeds according to a definitely prescribed formula. On the other hand, there are certain general requirements for reflective thinking and these should be brought to the attention of students in training them in answering thought questions.

Two types of opportunity to use knowledge.¹—Although it is not possible to draw a sharp line of demarcation, problems may be classified on the basis of the degree of the reflective thinking employed in solving them. In mathematics, physics, and some other subjects, the author of a text frequently gives one or more illustrative solutions when a new type of problem is introduced. Students are

¹The distinction made here is sometimes expressed by contrasting "practical judgment" with "conceptional judgment." BAGLEY, W. C.—*Educative Process*. New York: The Macmillan Company, 1905, pp. 128-138.

then able to solve the problems given in the text by "analogy." The illustrative solution tends to provide a ready-made response. Usually some adaptation is required but there is relatively little reflective thinking. After a teacher has explained a rule or principle, he may ask his students to apply it in doing exercises that require a minimum of adaptation. This procedure is employed extensively in mathematics, physics, and chemistry. Similar opportunities for the use of knowledge occur when the student needs only to recall a rule or principle. For example, suppose a student has learned the procedure for solving quadratic equations with numerical coefficients and sometime later he encounters an equation which is somewhat different from any that he has solved before. He may control this new equation by recalling his knowledge relating to quadratics and utilizing it with a limited amount of reflective thinking. In such cases the mental activity of the learner is focused upon the recall or reconstruction of knowledge, and there is only a limited adaptation because the problem is only slightly new.

Contrasted with situations in which familiar elements predominate and for which acquired knowledge provides a partially ready-made control of conduct, there are problems which are primarily new. A student encounters some situations of this type in the original exercises in geometry. They are "hard" because he must construct an essentially new response by analyzing, associating, comparing, and synthesizing concepts, facts, and principles which he possesses or which he secures for this purpose by reading or in other ways.

The significance of this distinction.—This distinction is one of degree. One type of opportunity for using knowledge merges into the other. Both have merit as learning

exercises. However, the recognition of the two types of opportunities will be helpful in considering the direction of the acquisition of knowledge through use. In directing the doing of exercises requiring the application of knowledge with limited adaptation, the teacher's task is primarily to stimulate the work and to evaluate the results. Little explicit guidance is needed because when such exercises are clearly defined the doing of them is relatively simple. In the case of problems requiring a high degree of reflective thinking, the task of guidance frequently becomes one of major importance.

This distinction is also significant with reference to the outcomes engendered through the doing of the two types of learning exercises. The application of rules and principles in solving problems requiring limited adaptation contributes to the "mastery" of these items of knowledge but does not provide much experience in reflective thinking. Evidence of this fact is furnished by students who make high grades in mathematics but are unable to do satisfactorily exercises in other fields which require any considerable degree of "independent" reflective thinking. It frequently happens in college classes in educational psychology or methods of teaching, that students fail in answering questions that call for the application of facts or principles which they appear to understand. The usual explanation of this condition is that such thought questions are difficult. The reader of this text probably has experienced difficulty in doing some of the exercises placed at the end of the preceding chapters, even when he felt that he understood the principles presented in the chapter. One reason for this is that considerable reflective thinking is required in making the application. The complaint that students fail to apply what they know in dealing with

practical problems outside of school is due in part to the fact that such problems require a greater degree of adaptation of knowledge than do the exercises of the schoolroom. Since the latter provide relatively little experience in reflective thinking, students have difficulty in thinking out the answers to problems requiring much adaptation of knowledge.

Opportunities for problem solving in the high school.¹—When problems are mentioned, most teachers probably think of the exercises in algebra, geometry, and the mathematical aspects of physics and chemistry, but the potential opportunities for problem solving in these subjects are much less numerous than is commonly assumed. The manipulation of symbols in solving equations and in performing other mathematical calculations does not offer a challenge for much reflective thinking, at least after the early stages of learning. Many of the problems may be solved by analogy or by applying a rule explicitly defining the procedure to be followed.² Furthermore, the mathematical problems that appear in our textbooks usually provide the student with all of the facts that he needs, and it is seldom that the statement of the problem includes any superfluous

¹The opportunities for reflective thinking in the development of knowledge from experience and in connection with the reading of textbooks have been considered in the two preceding chapters. The opportunities which we are here calling problems tend to overlap these two classes of learning exercises but in a general way they are distinguished by the emphasis which is placed upon the use or application of knowledge rather than its acquisition. As a learning activity, problem solving may be thought of as supplementing the acquisition of knowledge through experiencing and reading. Furthermore, the reader should bear in mind that problem solving is only one of several learning activities. (See page 31 f.)

²Several authorities on the teaching of mathematics have urged that teachers of algebra use other types of exercises. For illustrations of a number of proposed types see: THORNDIKE, E. L.—*The Psychology of Algebra*. New York: The Macmillan Company, 1923, pp. 289-303.

information. Hence in solving such problems the step of "collecting data" is greatly modified. In fact, many high-school students simply proceed to use the facts that are given without attempting to ascertain whether the information is sufficient or some of it is superfluous.¹

In solving problems in real life one must "collect data," and this phase of the activity usually includes determining what data are essential. In school some of the greatest demands for reflective thinking occur in history, civics, and other social studies. Other opportunities occur in shop work, the translation of a foreign language, English composition, and literature. When no mathematical calculations are required, we are accustomed to call these opportunities for the use of knowledge "thought questions" rather than "problems"; but if we consider the degree of reflective thinking required in responding to them, thought questions are problems and frequently call for more reflective thinking than exercises in algebra, geometry, or the mathematical phases of physics and chemistry.

Amount of problem solving by students dependent upon textbook and teacher.—The extent to which potential opportunities for problem solving become actual, depends upon the textbook and the teacher. High-school students cannot be depended upon to discover very many opportunities for reflective thinking. These must be brought to their attention by the author of the text or by the teacher. There is a growing tendency for authors of texts in fields

¹In a recent investigation high-school students were given tests in which problems of the usual type were intermingled with some providing superfluous facts and others furnishing insufficient data. Only about one third of the students gave satisfactory responses. Slightly more than one third simply used the facts given without considering their appropriateness. DAILY, BENJAMIN W.—"The Ability of High School Pupils to Select Essential Data in Solving Problems." Teachers College, Columbia University, Contributions to Education, No. 190. New York: Bureau of Publications, 1925, p. 22.

other than mathematics to include a number of thought questions as learning exercises, but the teacher must assume the responsibility of creating many of the opportunities for problem solving. A teacher who neglects this responsibility will greatly reduce or even entirely eliminate reflective thinking in a subject rich in potential problems.

Furthermore, a potential opportunity for reflective thinking ceases to exist for a student when he is furnished with the required solution because he then has no difficulty to overcome. There are occasions when it is appropriate to ask questions which are answered by the text or for which the teacher has supplied the required response, but the learning activity in such cases is not reflective thinking. Hence, in creating opportunities for problem solving, questions must be asked for which the students do not possess the answer or cannot obtain it ready-made. The teacher should also bear in mind that after a thought question is asked, the student must be given an opportunity to think out the required answer.

Opportunities for problem solving limited in group work.—The opportunities for problem solving during the recitation period are limited unless the instruction is individualized. A problem is a personal affair. (See page 240.) Even when students have been grouped according to "general ability", the members of a class will differ with respect to initiative, interest, attitude, and ability. Reflective thinking is not a process which can be carried on according to a schedule predetermined by the teacher. The rate of reflective thinking will seldom be uniform for all members of a group. The word "reflect" implies that the thinking process is "slow." The different members of a class are inevitably thinking at different rates. Some will

grasp the problem quickly, others will do so only very slowly. The first hypothesis formulated by some will be correct while it will be discovered by others only after several trials. Many of the students will fail to verify the suggestions which occur to them. If the teacher attempts to make the solving of a problem a group enterprise, he will find it difficult to keep all members of the class active. Many of them will be only followers, i.e., they will trace the thinking of the leaders. If the teacher attempts to "force" the solving of a problem by making "leading" suggestions or "telling", his students will tend to trace his thinking rather than to think for themselves.

Problem solving outside of the recitation period.—In order to avoid a waste of time, a considerable portion of the problem solving asked of students must be done outside of the recitation period. If the organization of the school does not provide for the direct supervision of students in the preparation of their lessons, the teacher must confine much of his direction of problem solving to the stimulation and guidance of work that is to be done outside of the recitation period. Problems can be created and defined as a part of the assignment and the solving of them left to the students as a part of their study. At the next meeting of the class the teacher may call for the answers thought out and in this way inspect the results.

Devising learning exercises for the use of knowledge.—In formulating thought questions the teacher should bear in mind the explanation given on page 241. Any question that can be answered by quoting a statement from the text or other sources will afford an occasion for the repetition of knowledge¹ rather than for the use of knowledge.

¹In many cases the activity of the student will be limited to the repetition of the *symbols* of knowledge.

Hence, when the teacher desires to stimulate reflective thinking he should endeavor to formulate questions for which his students do not possess ready-made answers nor will be able to find ready-made answers.

There is no problem unless the student recognizes a difficulty to overcome. The teacher has failed to create a problem if the student is ready to give an answer immediately and without effort. Although promptness in giving correct answers to questions asked during the recitation is usually evidence of effective preparation in studying the assignment, it is also evidence that little reflective thinking is occurring during that period. If it is the purpose of the teacher to secure reflective thinking on the part of his students during the recitation, he should recognize his failure when all answers, even if they are correct, are given promptly. In such cases the recitation is primarily a period of drill. Hence, if the teacher wishes to make the recitation a thinking period, he must ask questions which involve real difficulties for his students. Since a problem is a personal matter, and it is not possible to predict accurately what questions will become problems for the various members of a class, the teacher may find it difficult to create a problem. In planning the lesson he should formulate a number of questions, as it is not safe for him to rely upon his ability to do this after the class has assembled.

Types of thought questions.—If we note the probable mental processes occurring in the reflective thinking called for by questions, we find that some require the student to compare, others to analyze, and still others to give reasons why. Although there is doubtless considerable overlapping in the mental processes which usually occur in answering thought questions, there appear to be sufficient differences to justify the recognition of a number of

types. The more important types are given in the following list.¹

1. *Selective recall, basis given.*

Name the Presidents of the United States who had been in military life before their election.

What do New Zealand and Australia sell in Europe that may interfere with our market?

2. *Evaluating recall, basis given.*

Which do you consider the three most important American inventions in the nineteenth century from the standpoint of expansion and growth of transportation?

Name the three statesmen who have had the greatest influence on economic legislation in the United States.

3. *Comparison of two things² on a single designated basis.*

Compare Eliot and Thackeray with reference to ability in character delineation.

Compare the armies of the North and the South in the Civil War as to leadership.

4. *Comparison of two things in general.*

Compare the early settlers of the Massachusetts Colony with those of the Virginia Colony.

Contrast the life of Silas Marner in Raveloe with his life in Lantern Yard.

5. *Decision for or against.*

Whom do you admire more, Washington or Lincoln?

In which in your opinion can you do better, oral or written examinations?

6. *Causes or effects, and reasons for.*

Why has the Senate become a much more powerful body than the House of Representatives?

What caused Silas Marner to change from what he was in Lantern Yard to what he was in Raveloe?

¹The types given here are taken from, MONROE, WALTER S., and CARTER, RALPH E.—“The Use of Different Types of Thought Questions in Secondary Schools and Their Relative Difficulty for Students.” Bureau of Educational Research Bulletin No. 14, University of Illinois Bulletin, Vol. 20, No. 34. Urbana: University of Illinois, 1923, pp. 6-7.

²It is not essential that the comparison be limited to two things.

7. *Explanation* of the use or exact meaning of some phrase or statement in a passage.
8. *Analysis*. (The word itself is seldom involved in the question.)
9. *Statement of relationships*.
Why is a knowledge of botany helpful in studying agriculture?
Tell the relation of exercise to good health.
10. *Illustrations or examples* (your own) of principles in science, construction in language, etc.
11. *Classification*. (Usually the converse of No. 10.) What is the principle involved here? What is the construction? To what class or genus does this individual belong?
12. *Discussion*.
Discuss the Monroe Doctrine.
Discuss early American Literature.
13. *Criticism as to adequacy, correctness, or relevancy*.
This type of question may refer to a printed statement, or a classmate's answer to a question on the lesson.

Some of these types of thought questions are more suitable for some subjects than they are for others, but in general the teacher should avoid overemphasizing any of them. Occasionally it will be helpful to make a record of the questions asked and classify them in order to ascertain whether any types are being emphasized and others excluded.

Criteria to be observed in devising thought questions.—

In addition to making certain that the question will be likely to require reflective thinking rather than the recital of a ready-made response and varying the types of questions asked, the teacher should consider the "content" of his questions. Although a question may be effective as a stimulus to thought, it may not be a good question. Questions should be evaluated on the basis of the educational value of what students learn by answering them. If the

knowledge outcomes resulting from the answering of a thought question are unimportant, the asking of the question can seldom be justified.

A large factor of a teacher's technique in asking questions is his ability to evaluate answers as they are given, and to ask appropriate supplementary questions when they are needed. A few pivotal or fundamental questions may be planned beforehand, but many of the questions must be extemporaneous and based upon the responses given to preceding questions. Experienced teachers may be able to anticipate to some extent the responses which will be given by their students, but they cannot definitely plan all of the questions to be asked during the recitation period. Ability to think clearly during the recitation period and to act quickly is a prerequisite for good questioning.

A thought question must involve a difficulty for the student, but the teacher should endeavor to avoid asking questions that require ability greatly in excess of that possessed by his students. In a recent investigation¹ such thought questions as the following were suggested as appropriate for students in the seventh and eighth grades:

Trace the progress of invention from 1865 to the present time and show why this period has been especially productive.

Discuss the rise of big business monopolies and the attempt at government control.

Discuss the present foreign policy of the United States.

If aliens are admitted to the United States, what qualifications should be required? What are the advantages and disadvantages of educational tests for immigrants?

How did the western frontier influence the development of the Democratic Party?

¹MONROE, WALTER S., and HERRIOTT, M. E.—"Objectives of United States History in Grades Seven and Eight," Bureau of Educational Research Bulletin No. 33, University of Illinois Bulletin, Vol. 23, No. 3. Urbana: University of Illinois, 1926, 68 pp.

Enumerate all the annexations of territory from 1783 to the present time. State the reasons for and the significance of each.

Students completing the eighth grade cannot think out complete and scholarly answers to such questions, especially during a recitation or examination period. At best they can do little more than recite what they have read or heard. Such questions would be difficult for college students if their responses were judged at all critically. In fact, most of the questions quoted would be appropriate as the problem for a graduate thesis. When high-school students are asked to respond to such difficult questions, their answers are usually evaluated with reference to low standards. Indefinite and poorly organized statements are accepted as satisfactory although they constitute very incomplete answers. Furthermore, the answers given seldom represent the result of thinking by the student; usually they are "free translations" of statements by an author or the teacher. It may be that the reciting of such statements in response to difficult thought questions has some value as a learning activity, but it does not constitute reflective thinking, and unless both the teacher and his students clearly understand this point they will tend to form an erroneous idea of the process of answering thought questions.¹

¹The writer has come in contact with a considerable number of graduate students who appeared to be almost entirely ignorant of the process of reflective thinking although in many cases they could recite a description of it. Their notion of the process of answering thought questions is illustrated by the student who defended a term paper consisting of statements taken from certain sources, the quotation marks being omitted, by saying that the paper represented research. "I searched for these statements and here they are." Probably several causes contribute to the acquisition of this attitude toward answering thought questions, but undoubtedly teachers encourage it by asking difficult questions and then accepting faulty answers as satisfactory.

Asking questions.—The teacher should state his questions in clear and definite terms. Whenever the nature of the subject matter will permit, thought questions should be grouped about major principles or topics. Sometimes this will mean a sequence of connected questions, the answering of one leading to the asking of another. The asking of unrelated questions tends to encourage encyclopedic learning, that is, the memorization of unconnected and unorganized facts.

In order to stimulate students to define a thought question, the teacher may state it in two or more forms, or ask a closely related series of questions before calling for an answer. Sometimes he may explicitly call attention to certain limiting words or phrases. When it appears wise to give emphasis to this aspect of the procedure of answering thought questions, the teacher may ask students to restate the question in their own words, or to explain what certain words and phrases mean. The asking of a fundamental or comprehensive question may be prefaced by telling relevant facts or even by asking some preliminary questions. Such a procedure will assist in securing a "proper frame of mind," and frequently will serve to motivate the answering of the question by bringing conflicting or incompatible ideas to the attention of the students.

Questions should be asked so that they will stimulate the maximum thinking on the part of all members of the class. Usually a question should be stated before a student is designated to answer. If the reverse of this procedure is followed, the students, other than the one called upon, are likely to do little thinking about the question.

The teacher should adopt some device which will secure a proper distribution of the questions among the members of the class. This, however, does not mean that the

distribution should be regular or even uniform. The teacher should not call upon the students in regular order. In fact, it is doubtful if any predetermined order should be followed at all closely. If the teacher's purpose is primarily testing for diagnosis, then the questions should be distributed so that the status of the achievements of the several members of the class will be learned. More questions may be required to diagnose some students than others. In fact, the teacher may already be aware that certain students know the topic and hence for diagnostic purposes they need not be asked any questions. On the other hand, if the purpose is to emphasize or develop certain ideas, it may be advantageous to call upon students who can answer the questions well. Sometimes there will be certain members of the class, who by reason of their experience, or their exceptional ability, are able to make significant contributions to the class discussion. The teacher should avoid exploiting such students and consequently neglecting the other members of the class, but, in the writer's judgment, a teacher is justified at times in calling upon those who have "something to say" in preference to those who are almost certain to give unsatisfactory answers. The welfare of the students who have to listen to the answer, as well as that of the one who gives it, must be considered. It is difficult to justify oral questioning in a class if learning activity is confined to the one student who answers.

If the teacher notes evidence of a lack of interest on the part of a student, asking him a question will tend to stimulate him to active participation in the recitation. In case the teacher finds that he tends to neglect certain students he should make a memorandum of their names before coming to class and begin the recitation by questioning these students.

Problems growing out of difficulties and needs.¹—In “assigning” a problem by asking a question, the teacher frequently is not successful in getting the student called on to make the answering of the question his problem. If a student encounters a difficulty in pursuing some activity in which he is interested, he immediately has the problem of overcoming this difficulty. This fact suggests that it will be advantageous for the teacher to capitalize the difficulties which students encounter. In fact, the teacher may properly go so far as to manipulate conditions so that difficulties will be encountered. Frequently, however, no manipulation by the teacher is required. For example, in a manual training class, the boys approached the teacher at the beginning of the term with the request that they be allowed to make sleds. The teacher was aware that they did not possess the knowledge and skill required for such work but he assented to the request. In their endeavor to make sleds these boys encountered difficulties which created a number of problems. Even though some materials were wasted because very imperfect sleds were made, reflective thinking was stimulated.

In Chapter II we noted the difference between a logical and a psychological organization of subject-matter. When a logical organization is followed, there is a tendency to anticipate difficulties and to have students prepare for them before they are encountered. When this occurs the difficulties disappear. On the other hand, a psychological organization tends to increase the likelihood that difficulties will arise. Hence, a psychological organization facilitates the creation of problems.²

The teacher's direction of problem solving.—In direct-

¹This topic is treated more fully in Chapter XIV.

²Compare the discussion of motivation by creating needs. See page 90f.

ing the solving of problems by students, the teacher should constantly bear in mind that the learner must be active. There are occasions when the teacher should assist the student, but contributions by the teacher tend to deprive the student of an opportunity to learn. In general, the teacher should endeavor to confine his directive efforts to (1) giving general directions and advice relative to particular problems, (2) supplying information not easily obtainable by the student, and (3) evaluating the work of his students.

A list of general directions for solving problems.—This list of general directions is offered as suggestive. They may be dictated to the class at the beginning of the term, if printed or mimeographed copies are not available for distribution.

1. The first step in solving a problem is to define it clearly. In the case of a verbal problem consult a dictionary if you are uncertain concerning the exact meaning of some of the terms used. It is usually helpful to restate the problem in your own words. When the problem represents a difficulty that you have encountered, try to formulate a definite statement of it.

2. Keep the problem clearly in mind. If your work on it extends over a considerable period of time, it will be helpful to restate the problem occasionally.

3. Recall or consult the solution of similar problems for suggestions.

4. Begin to do something; consult a dictionary or some other reference; look up the solution of similar problems; try to break the problem up into a series of smaller problems. On the other hand, do not do things at random.

5. Work fast. You are more likely to think of the right hypothesis if you focus your attention upon the problem.

6. Do not be afraid to "guess." Excellence in problem solving requires boldness and license in "guessing" what the answer to the problem may be. "Guessing" is to be condemned only

when the problem solver accepts his guesses without verifying them.

7. Be critical in testing hypotheses. No answer is satisfactory unless it is consistent with all known facts and principles.

Evaluation of answers to thought questions.—The teacher's evaluation and criticism of answers are probably the most important phase of his instruction in training students to follow effective procedures. His standards, particularly in respect to completeness and precision of statement, should be high. General and indefinite answers should be discouraged. He should be suspicious of statements which fail to give evidence of reflective thinking. He should frequently ask students to give the reasons for their answers, or, better still, he should train them to answer in such a way that the reasons for their conclusions are apparent. The purpose is to educate students and not just to get certain questions answered. The teacher should focus the attention of the class upon the procedure employed rather than upon the answer obtained. Occasionally a student may be asked to tell how he arrived at his answer; and, if his procedure is good and stands out clearly, it may be used as an illustration to show the class how they should proceed to answer thought questions.

In recitation the teacher may call upon several students to answer the same question or ask several members of the class if they agree with the answer given. Such a procedure will assist students in developing a critical attitude toward answers to questions and direct their attention to the procedure employed in arriving at the answer. Sometimes it will serve to bring out points not in the mind of the teacher and tend to make all members of the class active participants in the recitation.

In maintaining a critical attitude toward the answers

to questions, the teacher should avoid being critical only of unsatisfactory answers. If he asks "why?" only when he considers the answer unsatisfactory, the students will soon "catch on" and assume that the answer is incorrect as soon as it is questioned by the teacher. Consequently a student will not defend the answer which he has given but admit that it is unsatisfactory at once.

Training students to solve problems.—In this chapter we are concerned primarily with the "using of knowledge" as a means of increasing one's knowledge in a given field, but this learning activity may make another important contribution to the student's education. In addition to increasing his mastery of ideas, facts, and principles, the student may learn how to proceed in solving certain types of problems. In such cases the outcomes of the activity of problem solving will include general patterns of conduct.¹ The engendering of this rubric of controls of conduct is considered in Chapter X, but it may be observed here that students will not learn much about how to solve problems unless the teacher makes it an explicit objective. Hence, from time to time the teacher may ask such questions as, "Can we improve our procedure in solving problems? Did you go about answering this question in the best way?"

Direction of problem solving considered in detail.²—

¹Some evidence that these outcomes may be produced has been reported by DAILY, BENJAMIN W.—"The Ability of High School Pupils to Select Essential Data in Solving Problems." Teachers College, Columbia University Contributions to Education, No. 190. New York: Bureau of Publications, 1925, 103 pp.

²The reader will find it helpful to supplement the following discussion by a study of stenographic reports of recitations in which reflective thinking was stimulated and directed by the teacher. Several excellent reports are given by HELSPETH, INGA OLLA.—"Children's Thinking," Teachers College Columbia University, Contributions to Education, No. 209. New York: Bureau of Publications, 1926, pp. 81-162.

Descriptions of a number of lessons are given by PARKER, S. C.—*Types of Elementary Teaching and Learning*. Boston: Ginn and Company, 1923, pp. 279-306.

The direction of problem solving will be considered in more detail by noting certain things that the teacher may do in connection with each step of reflective thinking. However, the reader should bear in mind that this activity cannot be forced and that if the teacher contributes to the solving of a problem he tends to lessen the student's opportunity to learn. The reader should also bear in mind that when the student engages in problem solving outside of the recitation period, most of the teacher's direction must be given in connection with the assignment of the exercise. Since the direction of learning outside of the recitation period is to be considered in Chapter XIII, the following discussion assumes that the activity is carried on in the presence of the teacher.

I. *Directing the defining of a problem.*—It is frequently asserted that the difficulty students experience in solving verbal problems in arithmetic and algebra is primarily one of reading. This is only another way of saying that the difficulty is confined largely to the step of "defining the problem." If a problem is concisely stated, its definition by the student is accomplished through a careful reading of it. In this reading he must associate accurate and precise meanings with the technical terms used. Take, for example, the problem, "If 100 g. of mercury at 100° C. are mixed with 100 g. of water at 20° C., and if the resulting temperature is 22.6° C., what is the specific heat of mercury?" In reading this problem the student must associate an accurate and precise meaning with "mixed with," "resulting temperature," and specific heat." Frequently the meaning of such terms as "compare," "explain," "why," "give reasons," "illustrate," and "summarize" is crucial in defining the questions in which they occur. If the student has not learned the meaning of a technical

term used in the statement of a problem, the determination of its meaning constitutes a subordinate problem which must be solved before the main problem is undertaken.

The preceding paragraph implies that the teacher may direct the student in defining a problem by asking what certain terms mean. In geometry, students are generally required to state formally what is given and what is to be done or proved. A similar procedure with reference to thought questions in history, physics, and other subjects would focus the student's attention upon this first phase of problem solving. A request to restate the problem, using other terms, will sometimes be helpful.

Frequently a problem may involve a number of subordinate questions which are not apparent until it is defined. For example, consider the question, "What is the value of supervised study in high school?" In defining this problem, one encounters a number of subordinate questions such as, "What is supervised study? When is a school procedure valuable? Will the value of supervised study be the same for all students? What are the characteristics of high-school students? Are they all alike? Will the value of supervised study be the same in all subjects?" When the student is dealing with a complex problem, the teacher may ask, "What subordinate questions are involved?" If this does not suffice as a directive procedure, he may mention some of the subordinate questions and ask if it will be necessary to answer them.

Defining a problem created by a difficulty encountered in realizing a purpose is frequently a simple matter but sometimes it involves the solving of a subordinate problem. After the existence of the difficulty is recognized, its nature must be ascertained before any progress can be made in overcoming it. For example, the driver of an automobile

notes an unusual noise which he interprets to mean that the machine is not functioning properly and hence needs repairing. His problem is to correct the maladjustment or other trouble, but before he can proceed to do this, he must determine what the difficulty is. In other words, he must *define* his problem. He faces a very different situation from that created by the problem, "Suppose a bearing in the differential of an automobile has become worn so that the gears mesh very loosely, what would you do?" In this case it is only necessary for him to read the question carefully in order to define this problem.

Another type of situation is illustrated by a construction project. Suppose a girl purposes the making of a dress for everyday wear. The realization of this purpose involves the solving of a series of problems. "What kind of material to use? What color? What design of dress? How much material? How to cut it out so as to waste as little material as possible? How to fit the dress? etc." Although some of these problems may be left until later stages of the work, several of them must be considered before the actual construction is begun. Failure to do this is likely to result in waste of material or in having an unsatisfactory dress.

As suggested in a preceding paragraph, the teacher should endeavor to guide the student in analyzing a difficulty by asking appropriate questions. In the case of a dressmaking project, the teacher might begin by asking, "What things must you decide before purchasing your material?" If the student overlooks an essential subordinate problem the teacher may ask,¹ "Do you need to consider.?"

¹When too great waste will not result it is sometimes advisable to allow the student to go ahead and discover his mistake later. He will then feel the need for correcting it.

The natural impulsiveness of youth is manifested in a tendency to neglect the definition of a problem. Even when the teacher is persistent in his stimulation and direction, students frequently proceed to the later stages of reflective thinking with only very indefinite concepts of the problem that is being solved. As a result they either fail to arrive at satisfactory answers or obtain them at the expense of unnecessary labor. Such occasions may be utilized to emphasize the need for defining the problem before proceeding to collect information and to formulate hypotheses.

II. *Directing students in collecting information.*—The “defining of the problem” should lead to an answer to the question, “What do I need to know in order to solve this problem?” If the student has failed to formulate an answer, the teacher may ask the above question or even suggest the answer by asking, “Will you need to know. . . .?” A student is not likely to be efficient in collecting information unless he has a definite idea of the class of ideas, facts, and principles needed. Hence a clearly defined problem is a necessary prerequisite for efficiency in collecting information, but when their attention is focused upon this activity, students frequently fail to keep the problem in mind. They tend to wander in much the same way that a committee or legislative assembly wanders when considering a question. When students tend to wander in solving a problem, the teacher’s function is similar to that of a presiding officer. When he detects evidence of wandering, he may ask, “What is your problem?”

In some cases the required information can be recalled from memory. In others some or all of it must be obtained from books or other sources. Unless there will be an undesirable waste of time, the student should be required to collect the information with little or no assistance from the

teacher. However, the teacher should not make this phase of problem solving unnecessarily difficult. Frequently he should give specific references as to where the information may be found and always he should try to prevent the collecting of information becoming random searching.¹ A student should be taught to discriminate and to pick out what he needs and to discard all else. In consulting printed sources one may easily be led astray by the trend of the author's discussion. Ideas which are important in general may have no value for the student's immediate purpose. The teacher may stimulate him to evaluate information and to reject that which is not pertinent by asking, "How does this relate to your problem?" "What use can you make of it?" and so forth.

On the other hand, it is important that the student's search for information should be comprehensive. Sometimes a conclusion is characterized as onesided, meaning thereby that either all the information has not been considered, or that certain items were given more weight than they deserved. Therefore, the teacher should stimulate and encourage a comprehensive survey of the field of the problem. He should train his students to be systematic. If information is being collected from printed sources, they should be examined systematically. When ideas, facts, and principles are to be recalled from memory, each of the "given" items should be considered relative to associated ideas, facts, and principles.² However, the teacher should bear in mind that reflective thinking is not a mechanical procedure and that the four phases which we have recog-

¹The collecting of information from books is considered in Chapter IX. A more elaborate treatment is given by LYMAN, R. L.—*The Mind at Work in Studying, Thinking, and Reading*. Chicago: Scott, Foresman and Company, 1924, pp. 63-78.

²See exercise, page 244.

nized in our treatment overlap in practice. Frequently a student may be justified in advancing to the formulation of a hypothesis and its verification before he has collected all of the information, but he should be taught to recognize that the work is not completed until he has brought together all of the pertinent facts and principles.

III. *Directing the making of hypotheses.*—The teacher can do little in directing the student in making hypotheses without limiting his opportunities for learning. If he gives much direct assistance, the activity of the students tends to degenerate into a relatively passive tracing of his thinking. The formulation of proposed solutions should be left to the student as far as possible. In case he is unable to construct a hypothesis, the teacher may suggest two or more possible solutions; but in doing so he should not confine his suggestions to correct hypotheses, as the student will soon form the habit of accepting any suggestion which he makes without an attempt to verify it. Sometimes the teacher may ask the student if he has solved any other problem like the present one or if he remembers any similar one worked out as an illustration in his text. However, the teacher should avoid giving the impression that problems are to be solved by recalling responses given to similar exercises.

Although a hypothesis is a guess, it should be made intelligently. Random guessing should be discouraged. If a teacher suspects that a student is proposing solutions with little or no reference to known facts and principles, as some students do in attacking a problem in arithmetic or algebra, he should ask him to tell why he has proposed the solution and should refuse to accept an answer which fails to show that the proposals are being made intelligently. Random guessing, if tolerated, frequently leads to a serious

waste of time in a recitation and also engenders a wrong attitude with reference to the solving of problems. Thorndike¹ refers to directing the making of hypotheses as the most crucial step in deductive teaching and suggests that the teacher ask subordinate questions which will tend to systematize the student's search for hypotheses.

IV. *Directing the verification of proposed hypotheses.*—The final phase of problem solving is the verification of the solution that has been proposed in the form of a hypothesis. In the case of a verbal problem in algebra or physics, a student may try out his hypothesis² by making the calculations for which it calls. If the correct answer (i.e., the one given in the text) is obtained, the student usually concludes that his "proposed" plan of solution is right; if the correct answer is not obtained and an examination of the calculations reveals no error, he concludes that his hypothesis is incorrect. When an answer is not given in the text nor supplied by the teacher, the process of verification becomes more difficult but is considered accomplished when the answer is proved correct.

The type of verification described in the preceding paragraph is relatively simple and is accomplished in a somewhat mechanical fashion. In geometry, it is also relatively easy to determine whether the proposed solution of an original exercise is satisfactory. In the laboratory or shop a student may "try out" a proposed solution and observable results will tell him whether it is correct. Answers to thought questions in history, civics, English literature, and so forth cannot be verified in this way. Take, for example,

¹THORNDIKE, E. L.—*The Principles of Teaching*. New York: A. G. Seiler, 1906, p. 161.

²The hypothesis in this case is the plan of solution. In algebra it is expressed by equations formed from the statement of the problem.

such questions as, "Compare the early colonists of Massachusetts with those of Virginia." "Discuss the Missouri Compromise." "Explain why grease may be removed from clothing by covering it with blotting paper and then passing a hot iron over the paper." "What should be a teacher's objectives in a course in general science?" "Should a large city (population of 100,000 or over) own its street railway system?" "Should a farmer sell his crop of wheat when it is threshed or hold it for a higher price?" The verification of proposed answers (hypotheses) to such questions is to be accomplished by testing them for consistency with all available facts and with verified answers to related questions.

In directing the verification of hypotheses, the teacher should bear in mind that the testing of proposed answers is an essential step in the activity of using knowledge, and that the educative value of a thought question will not be fully realized unless the student determines the validity of the answers he proposes. When the teacher does this for him, he limits the student's opportunity to learn. He also encourages guessing, and the student is likely to acquire the conviction that there is no way whereby he may determine for himself the correctness of an answer which he may think out. The result of this attitude is that he tends to eliminate the step of verification from his reflective thinking and to devote his efforts to seeking ready-made answers for the questions he is asked to answer. Occasionally the teacher may be justified in pronouncing an answer right or wrong but usually it is better for him to endeavor to stimulate verification by asking such questions as, "Does your statement agree with what we know about . . . ? Does it agree with your text?" If the student does not have

some of the necessary facts the teacher may state them and ask if the answer is in agreement. He may also ask concerning implications of the answer. In a class discussion he may ask other students if they agree. Frequently the teacher may stimulate the student to verify his answer by asking "Why?" or "How do you know this to be true?" In case the answer is in the form of a generalization, the teacher may suggest exceptions.

In directing this phase of problem solving, the teacher should recognize that the verification of answers to thought questions cannot always be made final as in the case of mathematical problems. We commonly speak of "honest differences of opinion," meaning thereby that competent persons in possession of the same information have reached different answers to the same question. Furthermore, in adult life competent persons not infrequently form judgments which are shown subsequently to be erroneous.

Evaluating problem solving as a learning activity.—In evaluating problem solving as a learning activity it is important that the teacher distinguish between the answer to the problem and the student's achievement.¹ In the preceding discussion the using of knowledge in responding to thought questions has been considered as a learning activity. Hence the student's performance should be evaluated upon the basis of what he has learned. From this point of view the correctness of the student's answer to a thought question is secondary in importance. The teacher should be critical of responses given by students and refuse to accept as satisfactory any in which he can detect defects, but he should endeavor to ascertain also what they have learned as the result of engaging in the

¹This achievement includes "ability to solve problems" as well as knowledge.

activity of problem solving. When the achievement is not satisfactory the teacher should assign additional thought questions or other types of learning exercises.

Common faults of procedure in answering thought questions.—In a recent investigation¹ a number of high-school teachers were asked to report what they considered the most common faults of procedure in answering thought questions. A few of the most significant replies are given below:

The pupil begins to answer the question before he has thought out what points should be included in the comparison. He often includes minor conclusions and omits important points.

Pupils when asked to tell "why?" seem to forget all reasoning and usually state the first thing that comes to mind, and fail also to go far enough in explanation.

A discussion, like a summary, often lacks point. The student fails to organize material and grasp essentials.

Pupils are often prone to feel satisfied if only a few of the factors or qualities involved in the analysis are learned and reproduced. Many times but one factor will be offered when to completely analyze the problem will require several. Being allowed to "get off" with a minimum of thinking is one of the chief causes of poor analysis.

The student discusses the phases of a general topic at random and separately without relating them to each other. Students fail to organize properly the data before expressing them.

They are not logical in the organization of their ideas. They answer, at least 85 per cent of them, only well enough so that one who knows already can tell what they know, but only about 15 per cent can arrange and subordinate well enough to be clear to the uninitiated.

¹MONROE, WALTER S., and CARTER, RALPH E.—"The Use of Different Types of Thought Questions in Secondary Schools and Their Relative Difficulty for Students," Bureau of Educational Research Bulletin No. 14. University of Illinois Bulletin, Vol. 20, No. 34. Urbana: University of Illinois, 1923, pp. 21-23.

How teachers contribute to the use of faulty procedures by students.—Many of the faults of procedure in answering thought questions are due either to teachers maintaining an attitude of indifference to the existence of these faults, or to a lack of ability in evaluating student responses with reference to the faults of procedure in reflective thinking. In the investigation just referred to it became apparent that a considerable number of teachers are satisfied with telling students that the answer is right or wrong. If they go further than this in the case of an incorrect answer, they state what the answer should have been but do not attempt to get their students to understand how they might have thought out this better answer. Teachers appear to be concerned primarily with the accuracy of the answer; and, when it is wrong, they do not try to discover the cause in the procedure which the student used. Undoubtedly it has not occurred to many teachers to give attention to the procedures employed by students in answering thought questions.

The teacher may very easily discourage reflective thinking as the means of answering questions. Insistence upon a certain form of statement or an answer in the words of the author or of previous discussions in class will cause students to attempt to answer all questions from memory. They frequently give evidence of this tendency by asking the teacher, "What do you want as an answer?" or by commenting upon an answer which has been accepted as satisfactory, "I did not know that you wanted that answer." When students make such statements, they give evidence that they have failed to recognize that the answer to a thought question is to be reached by a process of reflective thinking. Sometimes students go as far as to take the position that giving a satisfactory answer is

merely pleasing the teacher rather than determining what the conditions of the question require.

LEARNING EXERCISES FOR THE READER

1. Illustrate the statement: "Every adaptation involves the formation of new associations in addition to strengthening old ones and is itself an experience which may be utilized in the development of new knowledge."

2. Distinguish between "use of knowledge" and drill.

3. Write three "thought questions" and three "fact questions" based upon the first ten pages of this chapter.

4. From the point of view of this chapter explain three characteristics of a problem. Give as an illustration an exercise which would be a problem for you and show how it possesses the three characteristics you noted.

5. Express in your own words the difference between a "potential problem" and an "actual problem."

6. Think over your high-school courses and describe that one in which you did the greatest amount of problem solving. Was this condition due to the nature of the content of the course or to the methods of instruction employed by your teacher?

7. Note the types of thought questions listed on pages 254-6, and give three questions illustrating each type.

8. Charters mentions three general classes of questions used by the teacher: (1) "test questions, which are intended to find out how well the pupils have mastered the material assigned; (2) developmental questions, whose purpose is to guide the pupils' thinking; and (3) informational questions, which are asked because the teacher really wishes to secure information for herself or to have it presented to the other members of the class." In thinking over your high-school life, which kind of questions, according to the above classification, was most used by your teachers?

9. An example of a well-defined problem usually is found in the exact wording of a question for debate. Select some question that you have heard debated (or formulate such a question)

and show how it could be carried through the four steps of problem solving described on pages 242-4.

10. Problem solving is an important activity in our lives. Spencer in his essay, "What Knowledge Is of Most Worth?" makes the following classification of everyday problems: (1) problems of health; (2) problems of making a living; (3) domestic problems; (4) civic problems; (5) recreational problems. For each of these classes give five typical problems.

11. Enumerate important principles that should be observed by the teacher in evaluating students' answers to questions.

12. Discuss the teacher's responsibility in training students to answer thought questions.

13. Why is it necessary for most problem solving to be done outside the recitation period?

14. Indicate important ways in which the school offers opportunities for the use of knowledge.

15. Recall from your own high-school experience occasions when your teacher apparently considered a problem with reference to the correct answer rather than to the character of the thinking.

16. In *Methods of Teaching in High Schools*, Parker discusses the direction of problem solving under the following heads:

- (i.) Defining the problem and keeping it in mind.
- (ii.) Stimulating fertility of suggestion.
- (iii.) Critical evaluation of suggestions.
- (iv.) Methods of organizing the material of thinking.

If you have access to Parker's text read his discussion beginning on page 185 and compare it with the treatment of the topic in this chapter.

17. The following formulation of the steps in the thought processes of students in solving "originals" in geometry has been derived from a careful analysis of a number of test papers.¹

- 1. Identification of the given and required elements (facts or relations) of the problem.
- 2. Search for direct outcomes of these elements and for

¹TOUTON, FRANK CHARLES.—"Solving Geometric Originals," Teachers College, Columbia University, Contributions to Education, No. 146. New York: Bureau of Publications, 1924, p. 66.

- groups of elements which involve given and required elements in known relations.
3. Selection of certain groupings of given and required elements as worthy of closer investigation in the attempt to pass from the given facts to the required outcome.
 4. Utilization of groupings of elements selected as in 3 above through: (a) Testing of a suggested method of reaching the desired outcome. (b) Testing as in (a) above and rejecting the method suggested, or (c) Creating new groupings of elements through drawing construction lines, etc., and then testing such combinations as in (a) and (b) above.
 5. Verification of the results of a completed solution through: (a) Syllogistic organization in exercises involving proof. (b) Interpreting and checking results in problems involving numerical data. (c) Discussion of limiting conditions and proof that the construction is correct where solutions involve construction.

Compare this description of problem solving with that given on page 242. Prepare a similar description of the process of answering thought questions in history or other subjects.

18. Would exercises like the following be useful in training students to solve problems in mathematics? In other subjects? Give your reasons.

Study the following problem for the purpose of discovering the statements expressing facts which you would need to use in finding the answer called for.

Mrs. James's husband died and left her \$5,000. For \$3,200 she can buy a house and lot suitable for her family of three children or she can rent a house for \$20 per month and invest her money in bonds at $5\frac{1}{2}$ per cent interest. It will cost \$60 a year to keep the house in repair. The tax rate based on 75 per cent of the value of the property is $7\frac{1}{2}$ mills on the dollar. The town is so small that the tax rate is not very high. She would insure the house for \$2,500, at 45 cents per \$100 for one year; both fire and storm insurance are included under this rate. What would be the most economical thing for her to do?

Check each statement expressing facts which you would need to

use in solving the problem. Do nothing to those statements which are irrelevant.

-1. The interest on \$3,200 at $5\frac{1}{2}$ per cent for one year is \$176.
-2. The property would be assessed for taxation at 75 per cent of its value.
-3. The bonds now paying $5\frac{1}{2}$ per cent are likely to pay 7 per cent in the near future.
-4. Sixty dollars per year would have to be spent for repairs.
-5. Mrs. James has three children.
-6. The insurance rate is 45 cents per \$100 for one year.
-7. In Mrs. James's town it is difficult to find a place to live.
-8. Mrs. James's husband died and left her \$5,000.
-9. Seventy-five per cent of the value of the property is \$2,400.
-10. It is possible to get insurance against storms.

CHAPTER IX

DIRECTING THE ORGANIZATION AND EXPRESSION OF KNOWLEDGE¹

The problems of this chapter.—As in the preceding chapters, the central problems relate to:

1. The devising of appropriate learning exercises.
2. The instructional techniques that the teacher should employ in directing the doing of them.
3. The evaluation of the performances of students.

Before taking up these problems it will be helpful to note certain things about the relation of language and knowledge, and the nature of organization and expression of knowledge as learning activities.

Relation of language and knowledge.—In Chapter VI, words, phrases, and sentences were considered as symbols of knowledge. It was pointed out that it is advantageous for the student to acquire the conventional symbols for the ideas, facts, and principles he learns and that thinking is carried on largely in terms of symbols. (See page 153 f.) In Chapter VII we considered reading as a learning activity in which the student brings into his consciousness the

¹Although this chapter is an integral part of the discussion of directing learning in the high school, prospective teachers should apply it to their own work as students. Many of the teachers in our schools are far from proficient in organizing and expressing knowledge. A teacher is seriously handicapped in directing students unless he is able to organize and express knowledge effectively. It is hoped that this chapter will contribute to increasing the proficiency of teachers in this respect, and that it may direct their attention to important instructional techniques.

ideas, facts, and principles for which the printed words, phrases, and sentences stand. Expressing one's ideas is the reverse of the process of reading. The student starts with ideas, facts, and principles and speaks or writes symbols which represent them. The expressing of knowledge is considered satisfactory only when the symbols used can be comprehended accurately by a competent listener or reader.

Organizing knowledge as a learning activity.—A sentence represents an organization of ideas. It is a statement of a connection between them. For example, when a student says "Water boils at a temperature of 212 degrees Fahrenheit," he expresses a certain connection between the ideas represented by "water boils" and "a temperature of 212 degrees Fahrenheit." Larger units of organization are represented by more complex sentences and by the successive sentences of connected discourse.

Learning has been described as making and exercising "modifiable connections" between a stimulus and a response.¹ Organizing knowledge is essentially this kind of activity. In the illustration in the preceding paragraph the concept represented by "water boils" may be considered the stimulus and the remainder of the sentence represents the response. Hence a student is engaging in learning activity when he organizes a series of ideas into a sentence. A more complex activity occurs when he organizes a series of sentences into a logical argument or an exposition of a topic.

The organization of a body of knowledge involves association, comparison, and evaluation. These are processes which occur in reflective thinking. In fact, "organization of knowledge" is one type of reflective thinking

¹See the statement of the laws of learning on page 37 f.

and much of the discussion of this topic in Chapter VIII is applicable. Preliminary to the actual organizing of a body of knowledge, one must formulate a definite purpose or aim which will function as a criterion in the subsequent phases of the activity.

Expressing knowledge as a learning activity.—Does one learn by expressing his ideas? An affirmative answer is apparent when the laws of learning are recalled. One learns whenever he exercises “a modifiable connection between a stimulus and a response.” Hence learning activity occurs when a student repeats a remembered statement. A more important learning activity occurs when he organizes his ideas and then selects words and phrases which will be clearly comprehended by a competent person. As observed in a preceding paragraph, expressing may be thought of as the reverse of the process of reading. When expression includes the organization of ideas plus the selection of words and phrases to use as symbols for them, it is obvious that a very important exercise of “modifiable connections between stimuli and responses” takes place. However, expression has not received very general recognition as a learning activity. This is especially true of written expression. Students are inclined to consider written exercises, especially those designated as examinations, as having little or no educative value. They fail to realize that frequently a request to prepare a written report affords a much greater opportunity to learn than an assignment to read what another person has written on the topic. Students also fail to realize that reciting and participating in discussions are productive learning activities. A student who explains a problem in physics will usually learn more from the activity than his classmates learn through listening.

Lack of clear thinking a handicap in expression.—Good expression is dependent upon clear ideas and a logical organization of them. This probably is the principal reason why many persons dislike to write. Grammatical and rhetorical errors and a limited writing vocabulary are handicaps, but on the whole they are minor ones in comparison with the lack of clear ideas. It is remarkable how other difficulties disappear as soon as the writer knows exactly what he wants to say.

Opportunities for organizing and expressing knowledge.—Expression, especially in written form, is generally associated with the teaching of English composition but there are many opportunities for organizing and expressing knowledge outside of English classes. Any learning exercise that calls for either an oral or written response is a request to express. The answering of a question involves expressing knowledge. If the question requires thinking there will be organization of ideas. Other opportunities for organization and expression of knowledge are afforded by requests to report on an assigned topic, to prepare an account of a field trip or of a laboratory exercise, to ask questions, and the like. As the work of a course is taken up day by day, the several topics tend to be separated. Hence, at the close of the term, there is opportunity to assign exercises that explicitly request a summary and organization of the course or certain units of it.

Most high-school subjects afford many potential opportunities for organizing and expressing knowledge, but the extent to which students engage in these learning activities is determined largely by the character of the exercises that the teacher assigns. For example, history affords opportunities for oral and written reports on topics, and for requests to compare, discuss, summarize, and the like.

A teacher, however, may confine his learning exercises to requests to read and to listen to the explanations and discussions which he gives in the form of lectures. Similarly a science teacher may restrict his learning exercises to requests to observe demonstrations, listen to explanations and descriptions, read the text, solve problems, and perform laboratory exercises.

Although the importance of organizing and expressing knowledge as learning activities¹ would probably be admitted by most teachers, critics of our schools, especially our high schools and colleges, assert that these activities are neglected. It appears that many teachers are not resourceful in devising learning exercises and as a consequence overwork requests to read the textbook and to listen to their own explanations and discussions. When teachers attempt to secure expression, they frequently resort to questions that can be answered by repeating statements from the text. In such cases the activity of the student is relatively unprofitable and "reading to remember" is encouraged. (See page 200.)

Failure to stimulate sufficient organization and expression of knowledge is undoubtedly due largely to an insufficient recognition of the importance of these learning activities and to the teacher's inability to devise appropriate exercises, but there are certain practical difficulties that should be recognized. In the high school, students are handled in classes—frequently, large classes. Only one student can talk at a time and consequently in classes of twenty-five or more the opportunities for engaging in oral expression is necessarily limited. Furthermore, it is necessary to consider the rights of the other members of the

¹The importance of providing a "balanced ration" of learning exercises has been mentioned in preceding chapters. See pages 229-30 and 256.

class. When one student talks, his classmates are expected to listen and the educative value of this activity depends upon what is said. When written expression is required the teacher faces the problem of handling the papers submitted by his students.¹

The handicap of these practical difficulties must be admitted, but if organizing and expressing knowledge are important learning activities, the teacher should provide opportunities for them. Many high-school teachers do this, even when their classes are large.

Nature of problems and topics assigned for special reports.—In discussions of problems and topics suitable for special reports, two requirements are usually mentioned. First, the problem or topic should be interesting to the students, and since students differ, it is frequently desirable to allow some opportunity for choice. The second requirement is that the students should have vital content to express. This means that they should have ideas to organize and express or be able to secure them by making a reasonable effort.

There is a phase of this second requirement which is important enough to be listed separately. The problem or topic should be simple. If it is beyond the students' experience and training, their treatment of the assignment is almost certain to be superficial or copied from available sources.² Either response does not have a very high educative value and is likely to encourage an erroneous concept of what it means to deal with a thought question or to discuss a topic.

In addition to being simple the topics should be definite. For example, a request to discuss the heating of residences

¹This problem is considered on page 308 f.

²See page 257 for illustrations of inappropriate thought questions.

may be limited by restricting the discussion to transmission of heat. This eliminates kinds of fuels, care of furnace, regulations of heat, and a number of other sub-topics which might be included in a general discussion of the heating of residences. A general request such as, "For to-morrow, find out all you can about.," affords the student no basis for the evaluation of knowledge. A very different situation is furnished by the exercise, "For to-morrow, discuss three advantages of. Make certain that you select the advantages which are most important and take them up in the order of their relative importance. In the discussion of each, make clear the nature of the advantage and the reasons why you consider it important."

The question of appropriate topics for themes has received attention in many discussions of the teaching of English composition. Student activities in connection with the school and leisure-time occupations afford an important source of vital topics. The vocational interests of high-school students constitute another important source. Many topics of general public interest are suitable for high-school students.

Motivating the organization and expression of knowledge.—The nature of the exercises assigned and the standards¹ by which the performances of students are judged

¹The following statements from the report of a study of the attitude of junior high-school pupils toward written reports are significant:

"When teachers of history, science, geography, and all other subjects in which writing is a part of the learning *demand* careful writing, they can get it, but they must convince the pupils that careless or slovenly writing will not be tolerated, and they must convince by deeds, not by words, . . . let them return all papers carelessly written or grossly incorrect or untidy and keep on returning them until the pupils are convinced that they must be careful. . . . As one of our prize lesson-learners confessed, 'I expect to write good English when I have to but not when it doesn't count against me.'" SHEPHERD, EDITH E.—"The Attitude of Junior High School Pupils toward English Usage," *School Review*, 34:586, October, 1926.

do much to stimulate the organization and expression of knowledge. A strong motive may be secured by creating a real audience situation. A "real audience" is one that is interested in listening to or reading what is expressed. It is not possible to provide a real audience for all of the expressing that high-school students should engage in, but the resourceful teacher will be able to devise a number of ways to appeal to the instinct of communication. Occasionally the class may be utilized as an audience. This is especially appropriate when a student is able to contribute information in which the class is interested. For example, a student may be familiar with a city, country, or event being discussed by the class and hence able to contribute information not given in the text or other available sources. If there is a school paper some of the best reports may be published in it. In a small community a few of the reports and themes judged to be most interesting to the general public may be submitted to the local paper for publication.

Directing the collecting of information.—The second of the three central problems of this chapter relates to the instructional techniques that the teacher may employ in directing the organization and expression of knowledge. Preparatory to engaging in these learning activities the student must collect the ideas, facts, and principles which he attempts to organize and express. When responding to questions during the recitation period and to other minor assignments the "collecting of information" is accomplished by recalling ideas, facts, and principles bearing upon the question or topic.¹ When the assignment calls for an extended report it is usually necessary for the student to collect information from encyclopedias, reference books,

¹The instructional techniques to employ in directing this activity have been considered on page 268 f.

periodicals, or other sources. The reading of sources when searching for information was considered in Chapter VII, but before this reading can be very fruitful it is necessary to locate references pertinent to the topic. In the case of encyclopedias this is a relatively simple task but when information is sought in other sources, much time may be wasted or important references overlooked if the student does not follow an effective procedure. The teacher may give explicit references but high-school students should learn to locate references for themselves.

Some high schools make explicit provisions for training all students to use encyclopedias, yearbooks, and other reference books available in either the school library or other libraries to which they have access. In case the school does not provide such training, a teacher who assigns topics for report should assume the responsibility of giving his students such training as may be necessary. In addition to becoming acquainted with the card catalogue of the library, the students should be informed regarding the various classes of reference books contained in the library and should learn how to use *Poole's Index* and the *Reader's Guide to Periodical Literature*. Students should learn the general character of the information which may be obtained from the encyclopedias, yearbooks, etc., to which they have access as well as how to utilize these sources. Class discussion may be held on questions such as, "For what purposes should we use the encyclopedia?" "What kind of information can be secured from a yearbook?" "When should one consult an encyclopedia rather than a dictionary?" "When should one consult supplementary texts or periodical references rather than the encyclopedia?"

Locating the particular information desired is relatively

easy in general sources such as encyclopedias and year-books and little specific training will be needed. The finding of more specialized reference books in the library is more difficult. Students may be given exercises in the use of the card catalog such as, "How would you find reference books on the reconstruction period?" "Where would you look in the card catalog for references on Edison?" "What kinds of cards are filed in the catalog?"¹

After reference books have been secured, there remains the task of locating the particular passages which pertain to the topic on which a report is to be prepared. For this purpose students should be trained to use the table of contents and index of a book, in order that they may employ their time economically. It is not economical to read through the entire reference, even if it is done very rapidly, in order to locate a few pages which pertain to the topic in question. Sometimes a volume which bears a promising title may not contain any pertinent information. When students appear not to know how to go about locating information in a textbook, exercises such as the following may be employed:²

1. On what page is the map of Europe in the time of Charlemagne A. D. 814?
2. How many chapters are contained in Part IV of the book? How did you find out?
3. On what page is a colored plate showing a corner of the Parthenon?

¹An excellent discussion of how to use a library is given by MANLY, JOHN M., and RICKERT, EDITH.—*The Writer's Index of Good Form and Good English*. New York: Henry Holt and Company, 1923, Chapter I. See also: LYMAN, R. L.—*The Mind at Work in Studying, Thinking, and Reading*. Chicago: Scott, Foresman and Company, 1924, pp. 63-78.

²MONROE, WALTER S., and MOHLMAN, DORA KEEN.—"Training in the technique of Study," Bureau of Educational Research Bulletin, No. 20. University of Illinois Bulletin, Vol. 22. Urbana: University of Illinois, 1924, p. 14.

Tell how you found this page.

4. On what page do you find information about Amos, the peaceful reformer?

Tell how you found this page.

5. Name another book which the author gives as a reference to be read in connection with Chapter XVII.

Tell how you found it.

The teacher should direct students to define clearly the topic or question assigned and keep it in mind when reading to secure information upon it. It is usually advisable to take rather full notes on such reading but they should be limited to information that is pertinent to the topic. The teacher should advise students in regard to the form of the notes taken. The use of a loose-leaf notebook or of cards is usually desirable, and the student should be instructed to write on only one side. When cards are used it is wise to use separate cards for items relating to different points. This practice will assist in the organization. If the exact words of the author are copied, they should be enclosed in quotation marks. At the beginning of the notes taken on a reference, the student should enter (1) the name of the author or authors, (2) the title of the book, (3) place of publication, (4) name of publisher, (5) date of publication, and (6) the page or pages which are read. When the reference is in a periodical the items of a bibliographical reference are (1) name of author or authors of the article, (2) title or article, enclosed in quotation marks, (3) name of periodical given in full, (4) number of volume, preferably in Arabic figures, (5) pages covered by article, (6) year and month of publication.¹

Directing the organizing of information.—The organizing of information is not a mechanical activity. Definite

¹The bibliographical references in this text conform to these rules.

rules cannot be prescribed for it. Usually it is advisable to begin¹ the organizing of a body of knowledge by preparing an outline which shows the principal items of knowledge pertinent to the question or topic and their relation to each other. Such an outline in written form enables the student to "see" his collection of knowledge as a whole, and hence assists him in comparing, evaluating, and arranging the items. A writer needs an outline for much the same reason that a contractor needs blue-prints and specifications when he is erecting a building.

Although it is usually desirable for a writer to prepare a somewhat detailed outline in written form, this should be followed by a brief. An outline usually consists of separate words or short phrases which announce the topics or points that will be taken up in the report. For example, in an outline of a description of a city one would probably use such words as location, size, elevation, manufacturing, parks, schools, etc. These words do not express any information about the city in question. When used in an outline, "location" simply means that something will be said about the location of this city but gives no indication of what this will be. Similarly the other terms given above function merely to announce that the maker of the outline expects to say something on each of the points.

A brief is made up of statements which epitomize the principal items of knowledge being organized. It is not necessary that these statements be complete sentences but each one must express, at least in abbreviated form, an item of knowledge. A brief, therefore, fulfills a more comprehensive function than an outline. The making of a brief

¹Before the actual organizing can begin the topic or problem must be defined. A student who attempts to prepare an outline without a definite purpose, a clearly defined problem, is like a ship without a rudder.

forces one to think more clearly and more completely about the topic than the making of an outline. In fact, one may make an outline without clearly understanding the knowledge which it is intended to represent. To put it somewhat more bluntly, a student may make a satisfactory outline for a report on a topic without knowing very much about it. This cannot happen in the case of a brief because the statements which appear epitomize the discussion of the topic. Hence, an important function of a brief is that in making it a student is forced to have clearly in mind the knowledge he is organizing. An outline may be made as a preliminary step in making a brief, but it should not be considered as taking the place of a brief. It represents a much lower order of thinking than the latter.

An illustration showing the difference between an outline and the corresponding brief on the topic, "Written Expression as a Type of Learning," is given below.¹

THE OUTLINE

- I. Relation of organization of ideas to textbook reading.
- II. Relation of expression of ideas to learning.
- III. Clear thinking and expression of ideas.
- IV. The brief compared with an outline.
- V. Making a brief.
 - (a) Principal points.
 - (b) Subordinate points.
 - (c) Revision.

THE BRIEF

- I. Organization of ideas supplements the learning resulting from the reading of a textbook.
- II. Expression of ideas is an important learning activity.

¹This illustration and several of those given in the following pages are taken from the field of education. The reader should supplement his study of these pages by working out similar illustrations in the field of a subject he is preparing to teach.

- III. Clear thinking is a prerequisite for effective expression. When one has clear ideas it is usually easy to express them.
- IV. A brief differs from an outline in that it consists of phrases or sentences which express ideas instead of merely words or phrases that announce topics about which something will be said.
- V. The steps in making a brief are:
- (a) Clearly define your purpose.
 - (b) Formulate the principal and subordinate points of the discussion in complete sentences.
 - (c) Organize these so that they will present a satisfactory "trend of thought."
 - (d) Test each statement for precision and for its relation to the problem being considered and make whatever changes seem desirable.

A carefully prepared brief is an aid to writing. A brief is even more helpful to a writer than an outline. It epitomizes his "trend of thought." In the making of a brief little writing is required, and he has an opportunity to concentrate upon thinking about the problem. Details may be neglected for the time being. A distinct service which the brief renders is due to the fact that it represents a more advanced stage of thinking about the problem than does the outline.

Much of what was said in Chapter VIII with reference to the answering of thought questions is also applicable to the preparation of a brief. The first formulation of a brief should be considered tentative, and throughout the writing of the report each statement of the brief should be tested for relevancy to the purpose. The student should always bear in mind that he is expressing ideas pertaining to a specific topic and not merely any ideas. Many written reports are poor, not because the ideas included are not worthy of expression but because they are irrelevant to

the purpose at hand. Finally, the ideas to be developed in written or oral expression should be arranged so that the maximum effect upon the audience will be secured. Certain sequences of ideas are much more effective than others, and it may be necessary to experiment with several arrangements before a satisfactory one is secured.

Exercises for training in making briefs.—Although the best training in making briefs is secured by having the students make briefs on assigned topics, some training may be derived from having them prepare a brief of a printed discussion. In devising an exercise of this type, the teacher should note the organization of the discussion, and may well begin with articles or sections of a book in which the organization is easily discernible. When an author has inserted carefully formulated paragraph headings, they will usually form a reasonably complete brief. After the students understand what a brief is and have briefed a few easy selections, they should be given more difficult ones.

When students appear to have difficulty in understanding what a brief is, they may be asked by the teacher to prepare an outline and, when one has been formulated which "appears" satisfactory, they may then be required to prepare the corresponding brief. This type of exercise may be worked out coöperatively during the recitation period so that the teacher may furnish whatever guidance and assistance are necessary.

Characteristics of good expression¹.—A type of direction of expression as a learning activity is accomplished by calling the attention of students to the characteristics of good expression. Rules relating to paragraph construction,

¹This is not a discussion of the teaching of English composition, but rather an exposition of criteria that should be recognized as objectives in all high-school subjects in which organizing and expressing knowledge are important learning activities.

sentence structure, punctuation, and the like are given by texts on rhetoric and grammar.¹ Conformity to these rules is important, but the teacher should emphasize that good expression is not attained merely by writing a series of grammatically correct sentences in which each word is correctly spelled. These qualities are necessary but not sufficient. There are a number of other important characteristics, especially in extended reports and papers.

I. *Trend of thought*.—The phrase “trend of thought” is used as a name for a somewhat subtle and indefinite concept. It is, however, implied in a writer’s purpose with reference to his readers. The sentences and paragraphs which the writer sets down are for the purpose of rendering maximum guidance and assistance to a reader in thinking from the problem defined to its solution. The writer has thought through the problem and he is writing for the purpose of guiding the reader also in thinking out the same answer. This does not mean that the writer should describe his actual mental processes in thinking out his solution. Frequently his thinking involves much “scrapped thought,” and he should endeavor to guide the reader so that such waste will be eliminated. Therefore, the writer should rearrange his thinking about the question so that the reader’s thinking will be as efficient as possible. Ideas should be presented to him at the time he needs them.

Many qualities enter into a trend of thought. There

¹There are available a number of manuals in which the more important rules are arranged in a very convenient form. Teachers who feel a need for a dependable source of information relative to the form of written expression will find a copy of such manuals as the following very helpful: GREEVER, GARLAND, and JONES, EASLEY S.—*The Century Handbook of Writing*. New York: The Century Company, 1919, 228 pp. MANLY, JOHN M., and RICKERT, EDITH.—*The Writer’s Index of Good Form and Good English*. New York: Henry Holt and Company, 1923, 261 pp. WOODS, GEORGE B., and STRATTON, CLARENCE.—*A Manual of English*. Garden City, New York: Doubleday, Page & Co., 1926, 265 pp.

must first be a good general organization, then the rules of unity and coherence must be observed in each paragraph and sentence. All irrelevant material must be excluded. Good writing is not a series of isolated or unconnected statements even though each one itself may express an important idea or principle.

II. *Development of ideas.*—Words and phrases are used as symbols for ideas. For example, in this text “learning activity,” “reading,” “directing learning,” “objectives,” and “motivation,” are intended to stimulate in the mind of the reader certain ideas. One person’s concept of “learning activity,” for example, is likely to differ from another’s in wealth of associations and in richness of meaning, even when there is no actual disagreement. Because a writer has spent some time in formulating, enriching, and organizing his concepts, he is very likely to attach to the symbols used a richness of association and meaning much greater than that stimulated in the mind of his reader, unless he “develops” his concepts by explicit references to associated ideas and by appropriate illustrations. Hence, if a writer is to be efficient in fulfilling his function with reference to the reader, he must, at least in the case of an important idea, keep it with its associated ideas within the focus of the reader’s attention until it has been fully comprehended.

Many writers tend to abbreviate. Important ideas are mentioned incidentally or merely alluded to, and in some cases, omitted altogether. It thus becomes necessary for the critical reader to fill in the “gaps” in the thinking if he is to avoid a feeling of incompleteness. In such a case the writer has failed to fulfill his function in guiding his reader to thinking fully and clearly about the problem under consideration.

The writer who is familiar with the ideas relating to the

problem which he has studied may tend to under-rate the necessity of developing these ideas in writing. However, undesirable abbreviation frequently is due to the failure on the part of the writer to think sufficiently clearly and comprehensively about his problem. This characteristic usually applies to writing which we call superficial. When reading such a report a thoughtful person is left with many unanswered questions and with a feeling of insecurity about the conclusion because its basis is not clear or is perhaps unknown to him.

III. *Evaluation of ideas.*—In thinking about a topic many ideas may come into the mind of the writer. Some are pertinent to the topic; others are not. If extraneous ideas are introduced into the discussion, the reader's attention is likely to be distracted from the main issue. Hence, the good writer carefully evaluates his ideas and includes only those which in his judgment will be helpful to the reader in connection with the particular problem being considered. The good writer furthermore evaluates those ideas which he judges pertinent to his problem and assigns those of minor importance to subordinate positions.

It is not sufficient to reject only those ideas which are erroneous or unimportant in general. An idea may be very useful in connection with one problem but have little or no value in the treatment of another. Good writing is not merely recording good ideas. It is rather the recording of ideas which are good for a particular purpose. One of the difficult tasks of a writer is to stick to his text. His prejudices in favor of certain ideas constantly tempt him to introduce topics which have little or no connection with the problem.

Sometimes it is necessary to try out an idea or group of ideas in order to determine their appropriateness for the

purpose at hand. Most good writing is a result of many revisions. Sentences or even whole paragraphs which have been written at the expense of much effort are eliminated and others added. Sometimes a slight modification of an idea or the way in which it is presented will greatly increase its effectiveness.

The proper subordination of ideas is also important. As has been pointed out, the writer should seek to build up a "trend of thought." The effectiveness of the ideas included in this "trend of thought" depends upon the organization in somewhat the same way that the convenience of a house depends upon the arrangement of the several rooms. There should be a few principal ideas and all others should be subordinated to these. The reader will then be given a few major points which will serve as organizing centers for the related ideas.

IV. *Precision of statement.*—A precise statement conveys exactly the meaning intended by the writer. When read carefully by a competent person there is no uncertainty in his mind. He is not left in doubt on any point. He is not confused. He has no questions to ask about what the writer intended to say. It is obvious to him that the writer has very clear, definite, and precise ideas to express. A precise statement usually includes limitations and restrictions which should be kept in mind. The words used have been selected with a view to the precise shades of meaning which they convey.

Lack of precision may be due to (1) poor choice of words, (2) faulty usage of technical terms, and (3) omission of restrictive words and phrases.

The following brief quotations from "educational writings" have been carefully selected to illustrate the lack of precision of statement. However, the reader should

realize that these excerpts may lose much of their effectiveness as illustrations by being abstracted from the setting given them by their authors. The first quotation illustrates the effect of the choice of words upon the precision of statement:¹

In selecting drill material in reading, methods can be determined by a wise manipulation of reading tests.

The words, "method," "wise," and "manipulation" are poor words to use in this sentence. The following sentence expresses more clearly and precisely what the author appears to have had in mind:

The use of reading tests designed to reveal the specific deficiencies of children is helpful in selecting drill material in reading.

A second illustration is:

To overcome in a single grade the heterogeneous grouping of children from the standpoint of mentality, various administrative devices have been employed with varied degrees of success. Two of these devices, teacher's estimates of pupil's work and mentality tests stand out prominently.

In this statement one is confused because "teacher's estimates of pupil's work" and "mentality tests" are called administrative devices which overcome the heterogeneous grouping of children. They are not devices of this sort. They are rather instruments for securing information, which in turn may be used as a basis for grouping the children belonging to a single grade.

A considerable technical vocabulary has gradually been built up in the field of education. Many words which

¹The reader should supplement his study of these illustrations by searching for similar ones in high-school texts.

were already in use have been assigned very definite meanings. Failure to use such words in accordance with the technical meanings assigned to them greatly reduces the effectiveness of one's writing. The word "standard" is very frequently used incorrectly. For example:

In measuring certain educational products there too must be a standard corresponding to the many commercial standards. It is not for us here to question how educational standards are obtained.

It appears from what follows that in the second sentence this writer is using "standard" in the sense of "norm." In the first sentence it obviously has the meaning of "standard unit" such as a standard yard, or a standard pound. Hence, the meaning of the quotation is not clear, and the reader is likely to be confused or misled. It is probable that the writer failed to think clearly.

The quotation below illustrates the securing of precision through the use of restrictive terms:

In this chapter we shall not rehearse the facts concerning the boys and girls of *fourteen or fifteen* which are available in books on the psychology of *childhood and adolescence*, but shall report three studies which add new information concerning the select group of boys and girls *who enter American high schools*.¹

The words printed in italics add greatly to the precision of this statement. Their value becomes apparent when the statement is rewritten as follows:

In this chapter we shall not rehearse the facts concerning boys and girls which are available in books on psychology, but shall report three studies which add new information.

The following is an illustration of a paragraph which adds to the precision of the chapter in which it appears:

¹The italics have been supplied by the author of this book..

Care must be taken, however, not to leave the impression that the increased expenditure per child of school age means merely an increased cost of an identical service. During this period the public school system of the state has not only attracted and held in school a larger part of the children of school age, but it has expanded its "program" by establishing a more varied and elaborate curriculum, and additional service such as transportation of children, health service, kindergartens, vocational and continuation schools.

This paragraph serves to direct the attention of the reader to the avoidance of a conclusion which otherwise might be inferred from the figures just cited. It is also an illustration of precise writing. The words have been chosen carefully in order to convey exactly the meaning intended. Evidently the writer thought that the word "program" might not convey a sufficiently definite meaning and for this reason he has defined it.

It is obvious that precision in thinking is a prerequisite for precision in expression. It would be only accidental if one wrote precise sentences and paragraphs when he did not have precise ideas to express. On the other hand, it is not generally realized that faulty usage of technical terms, omission of restrictive expressions, and even a poor choice of words and phrases constitute evidence that the writer has failed to think clearly and precisely. There may be exceptions, but in general this may be accepted as an empirical rule.

V. *Diction*.—Although "trend of thought," "development of ideas," and "precision of statement" are potent in determining the quality of a report, a writer cannot communicate his ideas effectively unless he uses appropriate words and phrases. We have already referred to the development of a technical vocabulary in the field of educa-

tion. Some words that are used with only a general meaning in conversation and in non-technical fields have been assigned precise meanings in the field of education. Examples of such words are: standards (in educational measurements), intelligence, objectives, content, correlation, project, diagnosis, supervision, and motivation. Other words and phrases have been coined to represent ideas: junior high school, project method, achievement test, power test, supervised study, divided period, Dalton plan, and so forth. We have illustrated (page 299) how the use of technical terms affects precision of statements. A writer's skill in choosing verbs, adjectives, and adverbs also is very potent in determining this quality of his writing. Fine shades of meaning cannot be expressed unless appropriate words are used.

Expression affords an opportunity for "mastering" vocabulary through using it. As we have pointed out (see page 205 f) most high-school subjects involve a large specialized vocabulary many items of which represent abstract and general meanings. These may be learned in part through reading but they have not been mastered by the student until he has become fluent in using them in oral and written expression. The importance of providing opportunity to use new words and phrases is emphasized in the teaching of foreign languages, particularly a modern language. It is, however, not realized that other high-school subjects, particularly chemistry, physics, and general science, have "vocabulary burdens" which constitute learning tasks of considerable difficulty. In some cases they are probably more difficult than the learning of the vocabulary in Latin, German, or French.

In directing the use of "technical" vocabulary, the teacher should be critical. Since a "technical" word has a

very precise meaning, it is very easy to use it incorrectly. This fact probably has occurred to the reader as he has studied the preceding chapters of this text and attempted to discuss the topics treated. Carelessness in the use of a technical vocabulary is fatal to clear expression.

It is highly important that a writer be consistent in his use of terms. Any inconsistency will be annoying to the reader and may make it impossible for him to understand what has been written. Furthermore, lack of consistency in the use of terms and phrases is usually evidence of careless or superficial thinking about the problem being discussed.

Frequent recurrence of a word or phrase should be avoided. No terms should be overworked. No definite rule can be stated, but in general a writer should endeavor to avoid the repetition of the same word or phrase in a short sentence or in successive short sentences.¹ This rule is especially important in the case of an emphatic noun or verb.

VI. *Clearness*.—The function of a report is to stimulate in the mind of the reader certain definite ideas. If these ideas are not impressed upon him, if he misinterprets what is said or is left in doubt, the writer has failed either in his own thinking or in his medium of expression. This vital principle of clearness is the starting point for any sound treatment of a subject. Every good style is essentially a clear style. Good writers vary in their forms of expression. They may have, and usually do have, certain peculiarities, but they have in common the one aim of presenting their material in such a way that a reader is not troubled by the slightest obscurity or irrelevance.

¹This general rule does not apply to the more common prepositions, conjunctions, etc.

Rhetoricians, in general, agree upon three fundamental laws of composition. Clearness, force, and beauty are considered essential to really good writing. Both force and beauty are difficult of attainment because of their elusiveness and are largely the result of experience in writing.¹ Force is dependent upon the selection and arrangement of the words and phrases used and upon the proportional development of the ideas introduced into the discussion. Beauty is related to the structural organization, to the choice of words, and to the method of expression. Persistent effort and practice should enable one to write clearly and forcefully, provided one is able to think clearly. Beauty in the sense of artistic expression may never be attained, but if constant attention is given to the details of structure, if the vocabulary is enriched and if the form of expression is varied, a style, at least, will be developed which is neither laborious nor irritating to a sensitive reader.

Often it is necessary, in addition to making the exposition clear, to make it interesting. Initial interest is secured by the way in which the problem is introduced. Holding the reader's attention is dependent upon the manner in which the discussion of the problem is handled. Irrelevant statements tend to hinder the reader in getting the meaning. The presence of too many ideas is likely to be distracting and confusing. Verbosity on the part of the writer makes the reading laborious. On the other hand, if the statements are too bare, if the writer assumes too great

¹Many successful writers have testified that they secure a great deal of help from reading aloud from some good writer. In this way they are able to get the "feel" of the style of the author. One successful young writer made it a practice before beginning the writing of an article to read aloud from the works of William James. He did this not for the purpose of understanding James but rather for stimulating in his own thinking a flow of words which would have the quality of force and beauty as well as of clearness.

knowledge on the part of the reader, the ideas will not be fully grasped or appreciated.

A writer should remember that the average reader does not have the patience of the specialist in "wading through" details unless they add directly to an understanding of the discussion. Anything which is of use in increasing the interest of the reader is justified, but anything which is mere ornamentation is to be condemned. It may be said in general that flights of the imagination, elaborate figures of speech, and the use of poetical quotations are to be avoided in reporting educational research. Instead of assisting the reader in understanding the "trend of thought," they usually distract him. Furthermore, quotations, especially of a poetical nature, often serve to camouflage a lack of thinking on the part of the writer and tend to create in his readers a feeling of distrust.

VII. *Paragraph headings.*—In some textbooks paragraph headings are inserted after the writing is completed and are considered by the authors merely as devices to assist the reader, but many experienced writers find it helpful to formulate carefully worded headings before the following paragraph or paragraphs are written. When this is done, the statement that is underlined in a manuscript serves as a "text" that is to be written about. It functions as a criterion to which the writer may refer when formulating the following sentences. This suggests that a teacher should train his students to formulate carefully worded paragraph headings. These should consist of statements that express ideas and not merely "meaningless" words or phrases, such as usually make up an outline.

VIII. *Revising a manuscript an important phase of preparing a report.*—When expression is in written form,

there is an opportunity to assign the revising of a report as a learning exercise. Relatively few adults, even many of those who may be called experienced writers, are able to produce a good manuscript without one or more revisions. It is frequently necessary for college students to revise their reports several times in order to produce a manuscript which possesses much merit. If we admit that the quality of one's expression is an index of his understanding of the topic, it follows that for most students the revising of a report is a valuable learning exercise. However, if this exercise is to function, the writer must do more than merely correct misspelled words, grammatical errors, and the like. The teacher may give some indication of the changes needed, but a detailed marking of the paper will tend to deprive the student of the training the exercise should afford. He should again think through his discussion of the topic, critically examining both the general organization and the separate statements. The teacher may suggest that the student put himself in his reader's place and evaluate what he has written from the reader's standpoint. He should ask, "Is what I say precisely what I mean? Is what I say so shaped that it can readily be assimilated by him who reads?" The student's purpose should be to present his material in such a way that it not only is clear to him but cannot be misunderstood by another.

Directing oral expression.—The recitation period affords an opportunity for training in oral expression, but in order to capitalize this opportunity fully the teacher must give attention to certain aspects of the student's responses. He should insist upon the observance of grammatical rules and except when the recitation is upon the conversational level, students should be required to respond in terms of com-

plete sentences. We have already noted the importance of the vocabulary of a school subject. The teacher should insist upon the student "speaking the language" of the subject. Usually the use of technical terminology results in economy and forcefulness of expression, and in many instances it is essential for accuracy and precision of statement. This has been illustrated in the preceding pages of this text. Such terms as learning exercise, learning activity, control of conduct, reflective thinking, knowledge, objective, practice, motivation, attitude, etc., fulfill an important function in discussing the teacher's task. In fact, it would be difficult or impossible to treat this topic without using such terms. Similarly, effective discussion of many topics in history, physics, chemistry, and most other high-school subjects requires the use of special terminology.

Another point of special importance in oral expression is the length of the sentences. Although no definite rule can be stated, oral expression of high-school students is frequently faulty because too many short sentences are used. Good expression is not achieved by stating a number of ideas in sentences which tend to be isolated. The ideas expressed should form a sequence, a "trend of thought." The length of the sentences used is, however, only one of the characteristics which the teacher should note in connection with the length of the sequence of ideas. A comprehensive answer to a thought question or a report on a topic frequently requires the expression of an extended series of ideas. When this is the case, it becomes necessary that the student possess the ability to hold this series in mind so that he can secure an effective organization.

This ability is doubtless a native endowment in part but persistent training by the teacher will result in engendering some degree of it. Some exercises should be as-

signed for this purpose. For example, in the case of an exercise in which the student is asked to "discuss," the teacher may occasionally evaluate the response upon the number of minutes during which the student can speak fluently on the topic. Of course, the relevancy of the ideas expressed and other characteristics of the response should not be neglected, but emphasis upon the length of time occupied will stimulate the student, especially if the exercise has been assigned for preparation prior to the recitation period.

Evaluation of oral and written expression.—Language, both oral and written, may be judged with reference to its effectiveness as an instrument of communication. When evaluating it from this point of view the teacher considers clearness, precision of statement, and the other characteristics of good expression including spelling, punctuation, conformity to grammatical rules, and the like. This is the basis on which themes are usually graded, although items of form frequently receive more emphasis than the characteristics of good expression noted on pages 294-306.

Sentences, paragraphs, and more extended expression may also be evaluated as indices of knowledge—that is, what the student knows about a topic or question. This is usually the point of view from which teachers commonly evaluate both oral and written expression outside of classes in English composition. Misspelled words, grammatical errors, and other faults in form frequently are overlooked, or at least are considered as being relatively unimportant. Many teachers attach little importance to such characteristics as clearness, trend of thought, and precision of statement. They appear to accept the contention of students that "a person may know a thing and not be able to tell it," and if they are able to detect symptoms of ideas, facts,

and principles in the statements made by students, these teachers conclude that the knowledge has been acquired.¹

When expressing knowledge is considered as a learning activity, it is obvious that what the student says or writes should be evaluated as an index of achievement, but it does not follow that the form of his language or the other characteristics of good expression are unimportant. It is true that misspelled words or failures to conform to the rules governing capitalization have little significance as indices of achievement in such subjects as physics, geometry, or history, and some grammatical errors are relatively unimportant, but such characteristics as clearness, precision of statement, use of technical vocabulary, and sentence structure are indicative of the degree of mastery of ideas, facts, and principles. When unable to answer a question satisfactorily, students frequently offer as an excuse, "I know it but I can't tell it." Usually the apparent meaning of this assertion is not true. The fact is that the student has some imperfect and chaotic ideas about the question or topic, which lack clearness and organization and are not usable for the present purpose. In general, a high-school student can tell what he knows well, and unsatisfactory expression is evidence of incomplete learning. "Expressing is the perfecting of thinking, and a thought is not wholly born until it is expressed."

All high-school teachers should give attention to the form of the language of their students. They should insist upon grammatically correct sentences. This rule is justified on the grounds that coöperation is required in order to secure effective training in English. Furthermore, laxness in respect to the form of language frequently encourages a lowering of the standards by which other phases of achieve-

¹See the discussion of evaluating the responses to thought questions, page 263.

ment are evaluated. Painsstaking care in calling attention to language errors will contribute to building up the morale of the students with reference to school work. However, emphasis upon the form of language should not be allowed to interfere with giving appropriate attention to other qualities.

Oral language is usually judged by lower standards than those applied to written expression. This is probably justifiable but the high-school teacher should not allow his students to acquire bad language habits. For example, some students frequently conclude an incomplete and chaotic reply to a question by the phrase, "Well, you know what I mean." This is essentially an admission by the student that he does not possess the knowledge necessary for a satisfactory answer. The phrase "to a certain extent" and other qualifying expressions are employed to cover up evidence of ignorance, especially of detail. Qualifying phrases have a legitimate use, but the teacher should not permit students to employ them as a shield for their lack of knowledge.

A difficult phase of the task of evaluation occurs when the student repeats statements from the text or other sources. Such performances may represent the mere repeating of symbols of knowledge rather than a learning activity which is productive of knowledge. It is wise for the teacher to discourage the use of verbatim statements except when labeled as quotations. Much can be accomplished by assigning exercises that require the application of the text rather than the repetition of excerpts from it. When the teacher suspects that a student is merely repeating knowledge symbols, he should ask concerning the meaning or require him to express his ideas in different terms. The teacher who has in mind the relation between

language and knowledge and who makes a definite effort to interpret the student's language as an index of his knowledge, will soon learn to note significant symptoms. It has been the writer's experience that students who do not fully comprehend the technical terms of a given subject tend to make mistakes in using them. For this reason he attaches considerable importance to failures to use technical terms correctly.¹

LEARNING EXERCISES FOR THE READER

1. Milton used 8,000 words, Shakespeare 15,000. The average person to-day has a writing vocabulary of about 3,000. They have everything to talk about that Milton and Shakespeare had, and automobiles and radios in addition. It is said that the conversation of persons one hundred years ago was much more varied and much better from the point of view of expression than that of persons of to-day. How would you account for this deterioration?

2. Select those teachers who, when you were in high school, made the greatest effort to improve your oral expression; your written expression; and describe their work.

3. Make a list of principles which the high-school teacher should observe in directing the oral expression of his students.

4. Make a list of principles which the high-school teacher should observe in directing the written expression of his students.

5. Do you think a student who cannot write correctly should be granted a degree from a college or university? Defend your answer.

6. The statement frequently is made that incorrect habits of oral expression in childhood tend to persist through life, even though the person may have graduated from high school and

¹"Precision and accuracy in thinking and in the expression of thought are vitally conditioned by precision and accuracy in word uses." INGLIS ALEXANDER.—*Principles of Secondary Education*. Boston: Houghton Mifflin Company, 1918, p. 431.

college. In your university work you probably hear certain classmates make crude grammatical errors in their oral responses to questions. Do you feel that the elementary or the secondary schools are to blame for this condition? If so, why? if not, why?

7. Do you feel that the college instructor should deduct from grades in subjects such as a history, science, education, mathematics, and so forth because of failure on the part of the students to express their ideas in correct English? Defend your answer.

8. Discuss the distinction between an outline and a brief. Select any chapter which you have studied in this book and make an outline and a corresponding brief of it.

9. Suppose that you are a high-school teacher sending your class for the first time to "use" the library. Discuss the procedures you would follow with your students. (You may if you wish base this discussion on the subject that you expect to teach.)

10. In taking notes in the library what methods have you found most helpful?

11. Make a list of five books and of five periodical references, taking care that you include all the items of information stated on page 290. Whenever after this you make a bibliographical reference, keep in mind the correct form and use it.

12. The ability to write well and to speak well cannot be acquired offhand. With most of us extended practice is needed to enable us to express our ideas effectively. Do you talk usually only in the abbreviated "slangy" custom of the day and write good English only when you are made to? If you do, keep in mind that self-cultivation is within your power and that the way to improve is to seize every opportunity for speaking well in your daily conversations, in your classroom discussions, and on public occasions if possible, and for writing whenever you have a chance.

CHAPTER X

DIRECTING THE ACQUISITION OF GENERAL PATTERNS OF CONDUCT

The teacher's direction of the acquisition of two rubrics of controls of conduct has been considered: specific habits in Chapter V, and knowledge in Chapters VI, VII, VIII, and IX. In this chapter we shall deal with the engendering of general patterns of conduct which include ideals, attitudes, interests, and tastes. The reader should not infer from the space devoted to these controls of conduct that they are relatively less important than specific habits and knowledge. The reason for the limited treatment is that ideals, attitudes, interests, and tastes tend to be intangible and relatively little is known in regard to the instructional procedures that should be employed in engendering them. However, they include many of the most important controls of conduct which the high school is expected to engender.¹ As observed on page 161 the functioning of knowledge is affected by one's ideals and attitudes.

The problems of this chapter.—Most of this chapter will be devoted to an exposition of the nature and function

¹"To see to it that the ideals which accumulated human experience has shown to be worthy and to make for social welfare are safely and effectively transmitted from generation to generation is obviously a prime task of education." BAGLEY, W. C.—*Educational Values*. New York: The Macmillan Company, 1911, p. 60. Chapters IV, V, XI, XII, XIII, and XIV are excellent supplementary references for this chapter. The topic has been treated in a very helpful way by DEWEY, JOHN.—*Moral Principles in Education*. Boston: Houghton Mifflin Company, 1909, 61 pp.

of general patterns of conduct, but the following questions also will be considered:

1. What types of learning exercises are effective in engendering the intellectual element of general patterns of conduct?
2. What learning exercises may be used to engender the emotional element?
3. How may general patterns of conduct be evaluated?

Nature of general patterns of conduct.—There are three phases or elements of a general pattern of conduct: *first*, an understanding of the pattern which may be described in terms of rules and principles; *second*, a sensitiveness to situations in which the general pattern should function as a control of conduct; *third*, the capacity for a relatively strong affective (feeling) response to conformity and non-conformity to the pattern, both actual and anticipated. In the case of conformity the feeling response is described as satisfaction; when there is non-conformity it is described as annoyance.¹

The three phases of general patterns of conduct vary in relative prominence, especially the first and third. In some cases a clear and precise understanding of the pattern is essential; in others there is only a very limited concept of the pattern. In some cases the affective response to conformity or non-conformity is very strong; in others it is very mild. The sensitiveness to situations varies not only with reference to degree but also with reference to the range of situations. These variations result in several types of general patterns of conduct which are implied by

¹The second and third phases are sometimes combined by saying that a person possessing a general pattern of conduct exhibits a "strong disposition" to conform to it.

the terms attitude, perspective, ideal, interest, taste, and prejudice.¹ No attempt will be made to distinguish between types although it will probably be evident to the reader that different types of general patterns of conduct are considered.

A distinction between ideals and ideas.²—Ideals differ from ideas by the addition of an emotional element, a feeling of worth.³ For example, a child acquires ideas relating to the care of his teeth when he learns why he should care for them and how to do it. If in addition he comes to feel that frequent brushing and other attention are definitely worth while, he may be said to have acquired an ideal. The feeling of worth charges the ideas with a driving power which insures the functioning of the pattern of conduct defined by them even when opposed by other motives.

Good citizenship involves doing a number of things: respecting the property rights of others, cleaning walks after a snow, voting for the best candidates at elections, obeying traffic regulations, supporting worthy public enterprises, giving thoughtful attention to questions of public interest, and the like. One who knows about the activities under the head of citizenship and also how to perform them does not necessarily possess the "ideal of good citi-

¹The word "habit" is frequently used as a name for certain general patterns of conduct. For example, in oral discussions and even in books on education such phases as the following frequently occur: "Habit of neatness," "habitually accurate," and "habit of being systematic." The writer has carefully avoided using the word "habit" when referring to such controls of conduct because it has been employed in Chapter V to designate a different kind of outcome of the learning process.

²This distinction is similar to that pointed out by BAGLEY, W. C.—*Educational Values*. New York: The Macmillan Company, 1911, Chapter IV.

³A "feeling of worth" appears to be anticipated satisfaction or avoidance of annoyance as one considers conforming to the general pattern.

zenship." Unless one feels that the performance of the various activities is worth while and feels this to a sufficient degree, he is likely to be negligent in fulfilling his responsibilities as a citizen. In other words, merely knowing what a good citizen should do will usually result in failure to be a good citizen unless there is a constant application of driving power from some source outside of the individual. When one has acquired the ideal of good citizenship the driving power exists within himself.

The nature of an ideal may also be illustrated by the standards relating to school work. Students who appear to understand the requirements of neatness, punctuality, honesty, and the like for a satisfactory performance of a learning exercise, such as the writing of a theme, frequently exert little or no effort to meet these standards. The explanation is that such students do not recognize compliance with these standards as being sufficiently worth while. A student who values them will endeavor to attain them even in the face of obstacles. Such a student may be said to have acquired certain ideals relating to scholarship.

In each of these illustrations the distinction between the "idea" and the "ideal" has been emphasized. An inherent quality of an ideal is a "feeling of worth-whileness" sufficiently strong to insure that one will try to make his actions conform to the pattern of conduct defined by the idea element of the ideal.

An illustration of the range of situations in which a general pattern functions.—One phase of a general pattern of conduct is "a sensitiveness to situations in which the general pattern should function as a control of conduct." The report¹ of an attempt to specify the conduct of a

¹UPTON, SIEGRIED M., and CHASELL, CLARA F.—"A Scale for Measuring Habits of Good Citizenship," *Teachers College Record*, 20:59, January, 1919.

"good citizen in the elementary school" furnishes a basis for an enumeration of the situations in which a pupil's conduct should conform to the patterns included under the head of citizenship. For example, the pattern of conduct commonly designated as "courtesy" should control his actions on the following occasions:

1. When speaking to his classmates, teachers, or other persons.
2. During prayer or other devotions.
3. When meeting or being associated with girls or women (applies to boys only).
4. When another person is talking—a classmate, teacher, visitor, or a speaker in a public place.
5. When making requests of others.
6. When friends are ill.
7. When strangers or others make inquiries.
8. When one is seated and an older person is standing because no seat is vacant.
9. When other persons will be annoyed by whispering or other actions.
10. When addressing a person or answering a question.
11. When several persons desire to do the same things such as sharpen a pencil or drink from the fountain.
12. When entering a room or elevator accompanied by an older person.
13. When eating lunch at school.
14. When visitors are present at a recitation.
15. When another person drops something.
16. When handling books, pencils, and other articles.

At first a pupil may be courteous on certain occasions but not on others. This condition usually means that the pattern of conduct has not become sufficiently generalized.

See also: BOBBITT, FRANKLIN.—"Curriculum Investigations," Supplementary Educational Monographs, No. 31. Chicago: University of Chicago, Chapters VII to XI. CHARTERS, W. W.—"Ideals, Situations, and Trait Actions," *Elementary School Journal*, 25:424-36, 507-17, February, March, 1925.

In the terms of the analysis on page 314, the pupil is not sensitive to all of the types of situations in which the control of conduct should function. The preceding enumeration of situations in which a pupil should be courteous illustrates the range of situations for which a general pattern may provide a control of conduct.

The nature and function of attitudes.¹—Like ideals, attitudes are difficult to define and are not demonstrable upon demand. They have been identified and labeled even less than ideals.² Some of the more frequently mentioned are: judicial attitude, critical attitude, scientific attitude, friendly attitude, and inquiring attitude. Each of these terms designates a general pattern of conduct which is potent in determining the actions of one who has acquired it. For example, one who has acquired the judicial attitude will follow a fairly definite procedure in reaching a decision. He will first seek information on both sides of the question as well as rules and principles which are applicable; and then, carefully weighing the evidence, he will formulate his judgment. In contrast with the "judicial attitude" we have the "prejudicial attitude" which results in certain considerations being given extreme weight in reaching a decision. The judicial attitude is also opposed to "snap judgments" in which a decision is made before all of the evidence is in.

The "critical attitude" operates to cause one who pos-

¹The terms "ideal" and "attitude" are sometimes used synonymously, but general usage suggests a distinction. The conduct for which ideals provide a pattern is frequently described as "moral." For our purposes here a more significant characteristic is that the functioning of an ideal is usually observable or at least is accompanied by an observable manifestation. Attitudes, as the term is used here, refer primarily to patterns of "mental conduct" in the acquisition or use of knowledge.

²For a suggestive list of ideals see: BAGLEY, W. C.—*Educational Values*. New York: The Macmillan Company, 1911, pp. 175-79.

sesses it to question statements which he reads or hears and to seek their justification before accepting them as true. The absence of this control of conduct is illustrated by the person who believes everything which appears in print. A student who possesses the critical attitude will examine his formulations of answers to questions before giving them to the teacher. He will also be alert to detect inconsistencies in statements by authors of textbooks or by his instructor.

Interests, tastes, and prejudices as general patterns of conduct.—The terms “taste” and “prejudice” are used to designate patterns of conduct which are sometimes classified separately but are very similar to attitudes. A “prejudice” is a strong predisposition to act in a certain way. Such controls of conduct are frequently exhibited by the members of a family, community, or nation. A “feud” represents a conflict of prejudices. Tastes are less violent in their manifestations. Sometimes they are called “preferences” or “interests.” When a person is described as “interested”¹ in such activities as golf, music, gardening, travel, reading, poetry, or dancing, the characteristic of being “interested in” means that he “prefers” or “likes” the activity. The term “taste” is also used with a somewhat similar meaning, as when we say of a person that he has “good taste.” By this phrase we mean that the person referred to makes selections or choices in accord with artistic standards or criteria.

Descriptive definitions of two attitudes.—The following descriptive definitions of two attitudes are quoted from an article by W. Hardin Hughes.² The statements in the

¹As used here, “being interested in” does not mean a temporary condition. The idea of some degree of permanency is included.

²HUGHES, W. HARDIN —“A Rating Scale for Individual Capacities, Attitudes, and Interests,” *Journal of Educational Methods*, 3:60-61, October, 1923.

left-hand column describe the conduct of a person who does not possess the attitude or possesses it in a very slight degree; the statements in the right-hand column describe the conduct of one who possesses it in a high degree.

CONFIDENCE IN OWN ABILITY

Lowest Rank

1. Avoids responsibilities.
2. Expresses no ambition for worth-while achievement.
3. Hesitates about expressing own opinions.
4. Is pessimistic when confronted with difficult tasks.
5. Mistrusts own judgments. Is timid.

Highest Rank

1. Courts responsibilities.
2. Expresses ambition for worth-while achievement.
3. Does not hesitate about expressing own opinions.
4. Attacks difficult tasks resolutely.
5. Relies on own judgment.

INITIATIVE AND AGGRESSIVENESS

Lowest Rank

1. Possesses a minimum amount of intellectual curiosity.
2. Is characterized by a general lack of originality and resourcefulness.
3. Is satisfied when meeting the minimum requirements or less.
4. Lacks energy and enthusiasm in work.
5. Depends on suggestions and help from others when confronted by difficulties, and quits if help is not forthcoming.

Highest Rank

1. Evinces a high degree of intellectual curiosity.
2. Is extremely original and resourceful.
3. Assumes responsibility for doing much more than the ordinary.
4. Is energetic and determined in carrying out plans and purposes.
5. Finds ways and means for getting around difficulties.

A description of the scientific attitude.¹—The following description of the scientific attitude has been organized about the three phases of a general pattern of conduct noted on page 314. A person who has acquired the scientific attitude,

- I. Believes in universal cause and effect relations and understands the general principles relating to collecting data, their interpretation, and the validation of tentative conclusions.
- II. Possesses a sensitive curiosity concerning reasons for phenomena or the consequences of certain conditions.
- III. Derives satisfaction from
 - a. Systematic and careful search for data, even when it is prolonged and difficulties are encountered.
 - b. Testing data with reference to pertinence, validity, accuracy, and adequacy.
 - c. Suspending judgment until sufficient evidence is secured.
- IV. Is annoyed² by superstitious beliefs such as “signs,” “good or bad luck,” “unexplainable mysteries” or any other non-conformities to the principles of scientific procedure.

Study habits as general patterns of conduct.—In certain of the preceding chapters³ we have emphasized the recognition of study habits as objectives of the high school. When considered as controls of conduct many study habits should be classified as general patterns. They define a procedure to be followed in the performance of learning exercises and one who possesses a given study habit derives satisfaction from conforming to the procedure it defines.

¹See: CURTIS, FRANCIS DAY.—“Some Values Derived from Extensive Reading of General Science.” Teachers College, Columbia University, Contributions to Education No. 163. New York: Bureau of Publications, 1924, p. 48.

²It is implied that the person is sensitive to violation of scientific procedure.

³See: pages 73-4, 209 f and 245 f. The engendering of study habits will be considered more explicitly in Chapter XIII.

General patterns expressed as principles or codes of conduct.—The Ten Commandments describe ten general patterns of conduct. Many groups, such as lawyers, physicians, teachers, Rotarians, etc., have formulated codes that describe the general patterns of conduct to which the members of the group are expected to conform. Many patterns of conduct are expressed as principles. For example, one who accepts the principle that learning is an active process will find that it influences his thinking about many educational problems. The phrase, “social point of view,” is used to refer to the principle that the aim of education is to prepare a child for participation in the activities of adult life.

In order that a general principle may function as a pattern of conduct it must be thoroughly mastered and become indoctrinated as a part of one's intellectual equipment. “Learning” as this term is ordinarily interpreted is not sufficient. To the intellectual mastery of a principle there must be added a sensitiveness for situations to which it should be applied plus the capacity for deriving satisfaction from its application and for experiencing annoyance when the principle is violated.

Character a composite of general patterns of conduct.—If we analyze “character,” which is used as a term to designate a general and somewhat indefinite trait of men and women, we find that it is essentially a composite of the general patterns of conduct, especially ideals which one possesses. Hence, the engendering of ideals may be thought of as character building.

The importance of character as a general control of conduct is the basis for the statement frequently made that the teaching of ideals is the most important phase of the work of the school. Although a child would not be ade-

quately equipped for participation in the activities of adult life who failed to acquire many of the specific habits and items of knowledge included in the objectives of the elementary school and even of the high school, failure to engender the ideals which society approves constitutes a more serious educational fault.

The adaptable quality of general patterns of conduct.—Specific habits provide fixed responses for certain definite situations. Knowledge consists of controls of conduct which may be adapted to provide a response when a difficulty is encountered. Although general patterns of conduct are not adaptable in the way knowledge is, they function as controls of one's action in a considerable variety of situations. This fact is illustrated by such ideals as honesty, loyalty to one's friends, punctuality, neatness, living within the limits of one's income, observance of law, fairness, completing a task begun, and so forth. Each of these controls of conduct is a general mode or pattern of behavior applicable to many occasions. For example, one whose ideal of honesty is fully developed will not cheat on an examination, will attempt to return to their owners articles that he may find instead of appropriating them to his own use, will not take advantage of the mistakes of another in business dealings, will attempt to pay his debts, and so forth.

Apparent exceptions to the preceding statements are furnished by the person who is honest in certain things but not in others; who is neat in his personal appearance but untidy and careless in his office or at home; by one who is punctilious in observing certain laws but violates others; by one who is loyal to some friends but not to others, and so forth. By way of explanation two things may be said. A general pattern of conduct may not be fully developed

with respect to range of sensitiveness. For example, one may not have broadened his ideal of honesty to include written examinations or property owned by the state or a large corporation; a "law-abiding citizen" may not have extended his ideal of observance of law to traffic regulations or the Volstead Act. The emotional element may also not be fully developed and as a result other motives which are stronger tend to determine conduct in certain instances. The familiar saying that "every man has his price" illustrates this fact.

General patterns of conduct a basis for "transfer of training."—Although not pertinent to the problems of this chapter, it may be noted that the recognition of general patterns as controls of conduct provides a basis for explaining the "transfer of training." There is no actual "transfer," but a pattern of conduct functions to the extent of its generalization, i. e., over the range of situations to which the individual has become sensitive. However, it must be remembered that a person's actual conduct is the resultant of all of his controls of conduct, both native and acquired, that are active at a given time.¹

Two types of ideals.—It will be helpful to recognize two types of ideals,² (1) terminal and (2) regulative. Ambitions, broad aims, comprehensive purposes, and the like which are relatively permanent belong to the first type of ideals. If the emotional element is strong such ideals lead one to focus his attention for months or even years upon the attainment of the implied objectives. For example, one who has formed the purpose of obtaining wealth may direct his

¹For a more elaborate discussion of the "transfer of training" from essentially the same point of view see: JUDD, CHARLES H.—*Psychology of High-School Subjects*. Boston: Ginn and Company, 1915, pp. 392-435.

²BAGLEY, W. C., and KEITH, J. A. H.—*An Introduction to Teaching*. New York: The Macmillan Company, 1924, p. 243.

efforts to this objective and even employ dishonest and illegal methods in attaining it. Some recognition of the school's responsibilities for the engendering of appropriate terminal ideals is evidenced by formal provision for vocational guidance in the curriculum of a number of high schools.

Neatness, honesty, friendliness, respect for authority, sincerity, loyalty, punctuality, truthfulness, and the like regulate conduct in the attainment of terminal ideals.¹ In the following discussion we shall be primarily concerned with the engendering of regulative ideals.

General patterns of conduct a product of learning activity.—In the preceding chapters the point of departure for considering the engendering of controls of conduct has been the nature of the learning exercises which the learner should be asked to do. In the case of specific habits (Chapter V) it was possible to specify with considerable definiteness the particular types of learning exercises which should be assigned. It was also possible to make a number of definite statements with reference to the types of learning exercises which should be assigned in engendering knowledge. In both cases the activities called for by the learning exercises were relatively definite and the outcomes reasonably certain.

The discussion of the engendering of general patterns of conduct will be based upon the same principle, viz., that any control of conduct is acquired only as the result of the activity of the learner.² However, in considering the en-

¹It is possible to classify some of these patterns of conduct as terminal ideals, but if the two types of ideals are recognized it is more appropriate to describe them as regulative.

²A helpful general reference on this point is: BRIGGS, THOMAS H.—“Can Character Be Taught and Measured?” *School and Society*, 12:595-601, December 18, 1920.

gendering of general patterns of conduct we are handicapped by a lack of knowledge in regard to the types of learning activity which produce this type of outcome. The presence of an emotional element indicates that this activity is in part "feeling"; the intellectual element suggests that the learning activity is similar in part to that which produces knowledge.

Charters¹ lists five phases or steps in the teaching of ideals: (1) "Create the desire"—which may also be expressed as causing the learned to recognize or feel that the general pattern of conduct is worth while; (2) "Diagnose the situation"—which is important when undesirable general patterns are to be replaced by approved ones; (3) "Develop a plan of action"—which means "engender the intellectual phase of the control of conduct"; (4) "Require practice"; (5) "Generalize ideals"—which may be interpreted, "Secure the functioning of the general pattern of conduct in a wide range of situations."

General patterns of conduct produced as a by-product of the engendering of specific habits and knowledge.—It is sometimes stated that general patterns of conduct are produced as by-products in the acquisition of specific habits and knowledge. This means that concomitantly with the acquisition of these two rubrics of controls of conduct a student may also acquire ideals, attitudes, interests, etc.² Since much of the knowledge which is acquired will soon be forgotten, the by-products of the learn-

¹CHARTERS, W. W.—"Five Factors in the Teaching of Ideas," *Elementary School Journal*, 25:264-76, December, 1924. See also, by the same author: "Direct and Indirect Methods of Teaching Ideals," *Elementary School Journal*, 25:358-69, January, 1925, and "Ideals, Situations, and Trait Actions," *Elementary School Journal*, 25:424-36, 507-17; February, March, 1925.

²"So far as education is concerned, it is clear that the cultivation of ideals is an inevitable concomitant of proper instruction." BODE, BOYD H.—*Fundamentals of Education*. New York: The Macmillan Company, 1921, p. 75.

ing process may transcend in importance the direct products. In fact, the terms ideals, attitudes, and the like have been used as labels for the "residue" which remains after the knowledge has been forgotten. Undoubtedly many general patterns of conduct are acquired as by-products, but the mistake is often made of assuming, at least in practice, that the acquisition will occur automatically and that no specific attention is required on the part of the teacher. In an industrial enterprise by-products will not be secured unless they are made specific objectives. Likewise a teacher will not be efficient in engendering general patterns of conduct unless he makes definite plans for teaching them.

Many teachers of English fail in engendering a taste or liking for the reading of good literature because they bungle the direction of the study of literary selections. They require their students to do things with the selections studied which are not reading, and are not enjoyable to anyone except possibly a few specialists. In their effort to make the work rigorous and thorough, they ask innumerable questions¹ and they assign exercises which require tedious labor. One observer reported a teacher asking more than fifty questions on the first thirty-five lines of the "Cotter's Saturday Night" within a period of ten minutes. Certainly such "learning exercises" are not conducive to the engendering of a liking for this selection. Some teachers stress grammar and rhetorical structure. Others in their efforts to correlate English with other subjects emphasize related or even incidental information. The result is that the students are constantly required to do things which they dislike, and get little or no training in reading litera-

¹For an illustration see the description of a recitation in English literature on page 76f.

ture in a way which they might enjoy. The fault is primarily one of inappropriate learning exercises.

Learning exercises necessary for engendering the intellectual element of general patterns of conduct.—Many failures of teachers to engender general patterns of conduct are due to the neglect of the intellectual element. A student may desire to be courteous, tactful, friendly, sincere, efficient, loyal, dependable, neat in appearance, and so forth, but fail to acquire these ideals as effective controls of conduct because he does not have an opportunity to learn how to be courteous, how to be tactful, and so forth. Charters¹ tells of a group of stenographers and clerks who evidenced a desire to leave the office neat at the end of the day but who were unable to do so until a definite plan of arranging materials and equipment had been worked out. In an inquiry² to determine the extent to which "habits of selecting and demanding essential and adequate data" when solving mathematical problems can be engendered, four lessons were explicitly devoted to the topic. The results of the experiment showed that this "small amount of drill" made a considerable contribution to the engendering of this general pattern of conduct and that it tended to "transfer" to non-mathematical situations. The remark is frequently made that a certain person "means well," or that "his intentions are good." Such statements mean that the person's conduct is unsatisfactory because he does not know how to do what he would like to do.

¹CHARTERS, W. W.—"Five Factors in the Teaching of Ideals," *Elementary School Journal*, 25:269, December, 1924.

²DAILY, BENJAMIN W.—"The Ability of High School Pupils to Select Essential Data in Solving Problems," Teachers College, Columbia University, Contributions to Education, No. 190. New York: Bureau of Publications, 1925, 103 pp.

The application of the above paragraph to the problem of engendering ideals is that the teacher must give attention to the "how." In engendering the "ideal of neatness" the student must learn how to be neat as well as to value neatness as a pattern of conduct. In engendering the "ideal of good citizenship" the student must learn what items of conduct are included and how to perform them. An adult cannot be a good citizen when voting on a bond issue or the election of officials unless he knows how to judge the merits of the issue or candidates. In attempting to engender the "ideal of courtesy" it is necessary for the teacher to devise learning exercises that will cause the student to "know" the various acts a courteous person performs. An "ideal of scholarship" cannot be effective in controlling a student's conduct unless he is aware of the essentials of scholarship and knows something of the general procedure by which they may be attained. There are doubtless many students whose achievements are below their capabilities because they do not know what constitutes high achievement. They possess the desire to achieve but lack the intellectual element of the ideal. They "try," but their efforts are not directed so as to be effective.

It has perhaps occurred to the reader of the preceding paragraph that many persons do acquire ideals without explicit learning exercises relating to the intellectual element. Undoubtedly, this appears to be true. Very frequently children hold the religious and political beliefs of their parents. Many of the secondary schools of England, such as Eaton, Harrow, and Rugby, are noted for engendering certain controls of conduct among which are a number of attitudes. In our own country certain private schools are recognized as being conspicuously effective in engendering certain general patterns of conduct. The

United States Military Academy at West Point and the Naval Academy at Annapolis are particularly noted in this respect.

When we attempt to analyze the process by which general patterns of conduct are engendered in such cases, it is difficult to identify the essential conditions. Some institutions are noted for certain traditions and a person who comes under the influence of such an institution will frequently acquire the pattern of conduct designed by the tradition but just how or why is not entirely clear. Three general conditions may, however, be noted. The pattern of conduct represented by the tradition is clearly defined, it has the support of public approval, and violations of it are not allowed to pass unnoted.

In attempting to engender an ideal a teacher should analyze the intellectual element for the purpose of devising appropriate learning exercises which will lead to its acquisition. It is not safe to leave this aspect of ideals to mere incidental teaching. Although some teachers who are alert to take advantage of incidental opportunities may be successful in engendering ideals without definite planning, it is advisable for a teacher to exercise as much care in planning this phase of his work as in planning the engendering of specific habits or knowledge outcomes in algebra, Latin, history, or physics.

Good illustrations of exercises that were effective in engendering certain study habits are afforded by the detailed descriptions of the classroom activities carried on in an investigation in the field of United States history.¹ In an attempt to stimulate a group of seventh- and eighth-grade

¹HELSETH, INGA OLLA.—"Children's Thinking," Teachers College, Columbia University, Contributions to Education, No. 209. New York: Bureau of Publications, 1926, 163 pp.

pupils to improve their methods of thinking about questions in history the teacher occasionally interjected such questions as the following: "Are you certain that that is true?" "What is the trouble with the way we are doing the work now?" "What did you learn besides facts about . . . ?" "Is it worth while to try to think straight?" "Are we talking to the point?" "Is that real evidence?" "Have you found from our work any other suggestions on how to do your thinking?" "Is that a new point?" A study of the descriptions of the lessons shows that, although the engendering of the study habits was incidental, the instruction was carefully planned by the teacher.

In some cases it is helpful to assign the formulation of a statement of what a person possessing a given ideal, attitude, interest, etc., will do and will not do.¹ Such a learning exercise will serve to focus the attention of the students upon the intellectual phase of the general pattern of conduct, especially the range of situations in which it should function. The teacher may refer the students to available codes of conduct for suggestions. Special attention should be given to the form of statement.²

Learning exercises for engendering the emotional element of ideals.³—The emotional activity which will result in a feeling of worth cannot be directly commanded. In engendering a motor habit as in handwriting, typewriting, athletics, and the like, the performance of a particular learning activity may be secured by direct motivation procedures plus the request to do the exercises assigned. The absurdity of employing a similar teaching technique in

¹See the engendering of ideals of sportsmanship on page 335 f.

²SYMONDS, PERCIVAL M.—"Conduct Codes," *Educational Review*, 68:32-37, June, 1924.

³The reader will find it helpful to review Chapter IV on motivation, especially pages 105-8.

the case of ideals is obvious if we think of a teacher directing a class to "practice feeling the worth-whileness of neatness" for five minutes, or to "enjoy a picture." Under such conditions the emotional response is likely to be just the opposite of the one desired by the teacher.

Man is equipped by Nature with certain original satisfiers and annoyers.¹ To these, others are added as a result of the child's experience. Values, particularly among children, are in part determined by fashion, i. e., by the leaders of the group or in some cases by the majority. Students are likely to value patterns of conduct which appear to give satisfaction to those whom they admire. Hence, an effective learning exercise is devised when the teacher provides opportunities for his students to observe that the patterns of conduct he wishes them to value are truly satisfying to him. For example, if the teacher wishes to engender an appreciation of respect for law and order, he should consistently demonstrate that he feels this pattern of conduct to be worth while. If he wishes his students to value being punctual he should demonstrate that he derives satisfaction from being punctual. A consistent and genuine demonstration of the appreciation of values by the teacher is probably the most effective type of learning exercise for engendering the emotional element of ideals.

A general pattern of conduct is far-reaching. It applies to many situations. Hence, unless a teacher clearly comprehends it and is conscious of the scope of its application, he may violate it while seeking to engender it. For example, students will not be inclined to value a critical attitude

¹For a more extended discussion of this topic see: THORNDIKE, E. L.—*Educational Psychology, Briefer Course*. New York: Teachers College, Columbia University, 1914, Chapter IV.

if the teacher is not consistent at all times and fails to condemn uncritical thinking when it is encountered. A teacher who "fails to practice what he preaches" is greatly handicapped in securing recognition of the worth of a pattern of conduct.

It should be noted that emotional responses cannot be predicted with certainty. Some students may not respond to the example set by the teacher. In other cases the feeling of worth will be only temporary. However, the teacher who attempts to engender an ideal which he himself does not possess is laboring under a distinct handicap. This principle also applies to the engendering of interests and tastes. A teacher of science is not very likely to engender an interest in science unless he is interested in it. A teacher of English will not be very successful in engendering a liking for good literature unless he demonstrates that he enjoys reading such literature.

It is not difficult to secure recognition of the value of an attitude when it has the positive approval of the school or at least of those who are leaders. The task of a teacher is frequently made difficult because the attitudes he is trying to engender do not have the active approval and support of other members of the teaching staff. In no other phase of school work is united and coördinated effort as important. Although a skilful teacher who possesses a strong personality may be successful in engendering attitudes in the face of opposition, frequently a teacher fails because other members of the staff are indifferent or hostile to the objectives which he is endeavoring to achieve. Students are not likely to value a judicial attitude, a critical attitude, an inquiring attitude, a scientific attitude, and so forth, if some of their teachers disapprove of these patterns of conduct or are indifferent toward them.

We value those patterns of conduct which are useful in attaining purposes. This principle suggests a second method for engendering a feeling of worth for a given procedure, viz., to show that it is useful. The application of this method is difficult because many of the ideals we wish to engender do not appeal to students as being very useful in attaining purposes that they consider valuable. Frequently they are able to cite instances of the attainment of social approval, wealth, personal popularity, and the like by other students or adults who violate the ideals the school is endeavoring to engender. In attempting to secure the approval of a certain pattern of conduct the teacher may raise the question, "What effect would the general adoption of this pattern of conduct have upon the common good?" If the asking of such a question fails to secure the desired result¹ the teacher should not unduly press the matter. To do so would tend to make an issue of it, the students taking the defensive.² The outcome of such a situation will frequently be just the opposite of that desired.

If a general pattern of conduct does not possess real value students are likely to detect the fact. This does not mean that the value of a general pattern must be easily demonstrable, but it does mean that the teacher should endeavor to make certain that a control of conduct which he attempts to engender has value in life and that it is

¹The desired result is not a verbal answer, but an emotional recognition or feeling of worth. In such cases actions speak louder than words.

²"To take it for granted that high-school students expect to be honorable—to arouse the virtues of the gentleman and of the lady by behaving as if they already existed—is likely to be better teaching than any form of argument or legislation." THORNDIKE, E. L.—*The Principles of Teaching*. New York: A. G. Seiler, 1906, p. 183.

compatible with the ultimate purposes of education in a democracy. At a time when initiative and originality are emphasized and conflicts between points of view are prominent this phase of the teacher's task is not easy. The factual content of the curriculum is well defined in comparison with the ideals and attitudes that the school should endeavor to engender.

Methods of instruction a factor in engendering general patterns of conduct.—The concept of general patterns of conduct as by-products of learning activities leading to the acquisition of specific habits and knowledge implies that a teacher's methods of instruction are potent factors in the engendering of ideals, attitudes, and the like. If he is willing to accept work lacking in neatness he should not expect his students to acquire the ideal of neatness. If he readily accepts excuses for failure to be punctual, they are not likely to acquire the ideal of punctuality. If his methods do not encourage honesty, loyalty, persistence, and so forth, he should not expect his students to acquire these qualities.

Engendering ideals of sportsmanship.—A number of general patterns of conduct under the general title of sportsmanship are recognized as objectives by departments of physical education, particularly in connection with athletic activities. A recent writer¹ has indicated a general plan for engendering this group of ideals.

1. The employment of men, as directors of physical education and coaches, who practice the ideals that are to be engendered.
2. One or two intensive campaigns during the year to engender

¹STALEY, S. C.—“The Program of Sportsmanship Education,” Bureau of Educational Research Circular No. 28, University of Illinois Bulletin, Vol. 21, No. 49. Urbana: University of Illinois, 1924. 27 pp.

approval of the patterns of conduct plus attention to violations of the codes. (One of the objectives sought in these intensive campaigns is the education of the high-school faculty so that they will render active coöperation.)

3. The appointment of a sportsmanship committee to formulate a code of sportsmanship. (Appointments to this committee should be restricted to the outstanding leaders among the students and should be recognized as a distinctive honor. The formulation of this code is the responsibility of the sportsmanship committee but the entire student body should participate. So far as possible the contribution of the faculty should be confined to suggestions and stimulation.)
4. Securing the adoption of a code of sportsmanship.¹ (When a code has been adopted it should be printed and distributed. It should also be posted in a number of prominent places about the building, particularly in the locker room and gymnasium.)
5. A definite effort should be made to educate the general public. As a device for this purpose the code of sportsmanship may be printed on programs of athletic events.
6. The school should provide for some distinctive recognition of the best sportsman.
7. There must be a constant vigilance by adult leaders and the student committee. Violations of the code should receive attention.

Engendering trustworthiness.—In a recent experiment² the ideal of trustworthiness was made the objective of explicit training for a period of about three weeks. The methods employed "were such as are commonly used by the leaders of the Boy Scout troops," modified to fit certain principles formulated by the investigator. The status of the ideal of trustworthiness was measured by administer-

¹Several codes are given by Staley.

²VOELKER, P. F.—"The Function of Ideals and Attitudes in Social Education," Teachers College, Columbia University, Contributions to Education, No. 112, New York: Bureau of Publications, 1921, 126 pp.

ing a series of ten tests¹ at the beginning and a similar series at the end of the experimental period. The results show that the two groups which received the explicit training became distinctly more trustworthy, as measured by the tests, while two control groups made no progress.

The engendering of the intellectual element must not destroy the feeling of worth.—In assigning learning exercises designed to engender the intellectual element of a general pattern of conduct as well as in directing the doing of them, the teacher must bear in mind that he will fail if the feeling of worth is not developed. In fact, it is usually necessary to cultivate it along with the intellectual element. The teacher must be sensitive to the emotional status of his students. Ill-timed emphasis or too much insistence may kill rather than cultivate the feeling of worth. For example, too much emphasis upon the form and ar-

¹These tests were devised for the purpose of determining the extent to which a boy would conform to the pattern of conduct defined by the ideal of trustworthiness. He was confronted with ten situations and the character of his response noted. The general character of these situations is indicated by the following descriptions:

1. The overstatement test. (The subject is given an opportunity to make an overstatement concerning what he is able to do.)
2. Test of truthfulness and suggestibility. (A response is suggested which the subject knows to be false.)
3. Receiving-help test. (After being instructed to work independently, the subject is afforded an opportunity to receive help on an exercise.)
4. Reliability test. (Designed to measure the keeping of promises.)
5. Honesty test. (The situation is one involving a small error in a minor financial transaction.)
6. The tip test. (It is contrary to the rules of the Boy Scouts to accept tips. The situation is the offering of a tip for an act of courtesy.)
7. The push button test. (The situation is a request to follow certain instructions during the absence of the examiner.)
8. "A" test. (The situation is a request to follow uninteresting instructions when subjected to distractions.)
9. Closed-eye test. (The subject is requested to perform a task with his eyes closed. He can greatly improve his performance by peeping.)
10. Cheating test. (The situation is an obvious opportunity to cheat in scoring his own paper.)

rangement of written work or the imposition of arbitrary standards may cause students to feel that neatness as prescribed by the teacher does not have value. Many adults, who as children were subjected to certain types of puritanical regulations, testify to the formation of the determination that when they were released from parental control they would conduct themselves in a different manner.

Emphasis upon specific habits and knowledge through measurement a handicap in engendering ideals.—Although the importance of general patterns of conduct and the necessity of explicit efforts to engender them will probably be readily admitted by teachers, there is a tendency to neglect them in practice. Demonstrable results are demanded and considerable importance is attached to the number of learning exercises which students complete. The “getting of a lesson” is interpreted to mean the doing of certain learning exercises or at most the acquiring of certain items of knowledge. Ideals, attitudes, and the like are not demonstrable upon demand in the way that specific habits and knowledge are. If we wish to know about a child’s handwriting habits we ask for a sample of his writing; if we wish to learn a child’s ability to manipulate algebraic symbols, we request him to do appropriate exercises; if we wish to know a child’s command of a foreign language, we ask him to translate a passage. Since the possession of general patterns of conduct cannot be tested by such formal procedures, the emphasis in teaching tends to be placed upon those outcomes which are most easily measurable.

Our curricula are defined almost wholly in terms of specific habits and knowledge. Students study algebra, geometry, physics, European history, civics, typewriting, bookkeeping, manual training, and so forth. It is seldom

that a school offers a course explicitly designed to engender ideals. In the light of what we know about ideals it does not appear that the problem of engendering them would be solved by establishing a series of courses on ideals such as we now have for science, mathematics, or a foreign language. However, we should recognize that our present curriculum organization and the demonstrable quality of specific habits and knowledge constitute a handicap in engendering ideals which must be overcome by teachers in the planning of their work.

Evaluating general patterns of conduct.—In discussing the teacher's direction of the acquisition of specific habits and knowledge the need for evaluating achievement was emphasized. There is likewise need for evaluation in the case of general patterns of conduct, but their nature is such that it is difficult to accomplish it. We have observed that "actions speak louder than words." This suggests that in attempting to evaluate ideals a teacher should note the "actions" of his students rather than ask them to respond to definite exercises. This requires that he pursue a policy of watchful waiting, frequently observing "actions" over a rather extended period. He should do something by way of setting the stage, but this must be done indirectly. Significant actions cannot be secured upon demand.

In noting the "actions" of students there are two points to bear in mind. First, the teacher should endeavor to ascertain the degree of generalization which has taken place. The "general" quality of the pattern has not been acquired unless the student's "actions" conform to it over a considerable range of situations.¹ His conduct in the new or

¹See the description on page 337 of the tests used by Voelker in measuring trustworthiness.

unusual situation is especially significant. For example, the courteous student is the one whose conduct conforms to this pattern on unusual occasions rather than only on the familiar occasions. The second point to be noted is the quality of the affective phase of the student's response. In order to possess a general pattern of conduct he must derive satisfaction from conforming to it or at least experience annoyance when he becomes aware of non-conformity. The student who is not annoyed by his failure to conform to a general pattern has not acquired it. Furthermore, his annoyance must be due to the non-conformity and not to being "found out" or "caught." From the standpoint of the diagnosis of a general pattern of conduct it is not sufficient to learn that a student's conduct on a particular occasion is in accordance with accepted standards. The teacher should seek to ascertain the motive for his conduct. For example, a student may on occasion be courteous without feeling that courteous behavior is worth while. Similarly, he may be punctual because he dreads the consequences of tardiness rather than because he feels that punctuality is a worth-while pattern of conduct. It is essential that the student experience satisfaction from conforming to the pattern and be annoyed when he fails to conform.¹

¹An interesting and suggestive report of an attempt to measure certain general patterns is given by KELLEY, T. L.—"Values in High School Algebra, and Their Measurement." *Teachers College Record* 21:246-290, May, 1920. Other formal attempts to measure certain general patterns of conduct have been reported by VOELKER (reference on page 336), UPTON and CHASELL (reference on page 316), HUGHES (reference on page 319), CURTIS (reference on page 321), and DAILY (reference on page 328). See also REEDER, JOHN C.—"The Geneseo Scale of Qualities," *Elementary School Journal*, 20:292-96, December, 1919. RUGG, H. O.—"Rating Scales for Pupils' Dynamic Qualities: Standardizing Methods of Judging Human Character," *School Review*. 28:337-349, May, 1920. SHUTTLEWORTH, FRANK K.—"A New Method of Measuring Character Traits," *School and Society*, 19:679-82, June 7, 1924.

LEARNING EXERCISES FOR THE READER

1. Compile a list of situations outside of school in which the scientific attitude should function. Compile a similar list of situations in school work.

2. Primitive peoples have developed elaborate ceremonies and forms of worship. Many fraternal orders and other organizations, including some churches, follow elaborate rituals. When considered as a means of educating the members of a group, do such procedures conform to the pedagogical principles advocated in this chapter? Give your reasons.

3. Distinguish between "incidental teaching" and "accidental teaching."

4. Study "the program of sportsmanship education" on page 335 and prepare a program for engendering a scientific attitude.

5. Compile a list of ideals. Make it as complete as you can. Classify them as suggested on page 324. In compiling the list endeavor to distinguish between ideals and other general patterns of conduct. See page 318. Also endeavor to avoid duplication due to listing two names for the same thing.

6. Dewey distinguishes between "moral ideas" and "ideas about morality." Write out a distinction on the basis of the discussion in this chapter and compare what you have written with Dewey's discussion in *Moral Principles in Education*, pp. 1-4.

7. Discuss the proposal of a special course in character training or morals versus incidental engendering of general patterns of conduct.

8. What are the pedagogical implications of the following statements? "There cannot be two sets of ethical principles, one for life in school, and the other for life outside of school" (DEWEY, JOHN.—*Moral Principles in Education*, p. 7.) "The child ought to have the same motives for doing right and to be judged by the same standards in school as the adult in the wider social life to which he belongs." (*Ibid.*, p. 17.)

9. Prepare a description of culture in terms of the general patterns of conduct it includes.

10. Explain the following statement: "Culture is the capacity for constantly expanding in range and accuracy one's perception of meanings." (DEWEY, JOHN.—*Democracy and Education*, p. 143.)

CHAPTER XI

THE MANAGEMENT OF CLASSES

Chapter XI begins a major division of this discussion of directing learning in the high school. In Chapters V to X the several types of learning activity and their direction were considered separately. In Chapters XI to XIV we shall be concerned with a different group of problems. In Chapter I the reader's attention was called to the fact that the teacher's task was made more difficult because it is necessary to deal with large numbers of students, usually in groups rather than separately as individuals. The students assigned to a class usually differ widely in many ways that affect the teacher's task. Other instructional problems are created by the fact that only a portion of the learning activities of students take place in the presence of the teacher and hence under his immediate direction. Finally, although the purpose of the school is to prepare children for efficient participation in the activities of life outside of the school, especially adult life, the school has tended to be artificial, that is, its activities have been organized and directed for the purpose of having students attain certain objectives. Conduct materially different from that which prevails under normal social conditions is prescribed by arbitrary rules and tradition.

Although the problems to be considered are instructional rather than administrative, they relate to the managerial phases of teaching. In general they deal with the establishment and maintenance of appropriate classroom

conditions and the organization of instruction. There will necessarily be many references to principles discussed in preceding chapters. In some places the discussion may appear to be a repetition, but the point of view is different and, as pointed out on page 16, some repetition is necessary in attaining mastery of knowledge.

Problems of this chapter.¹—As the chapter title implies we are concerned here primarily with the problems relating to the management of classes. The two central questions are:

1. How may the teacher create and maintain classroom conditions that will afford the maximum facilitation to participation in appropriate learning activities?
2. How should the teacher deal with disciplinary offenses?

The management of classes is affected by the general

¹Writers in the field of methods of teaching have differed widely in regard to the emphasis given to the problems relating to the management of classes. Some have considered skill as a disciplinarian a paramount qualification for success as a teacher. They have pointed to investigations that showed "weakness in discipline" to be an outstanding cause of failure. (For a typical investigation see: BUELLESFIELD, HENRY.—"Causes of Failure among Teachers," *Educational Administration and Supervision*, 1:439-52, September, 1915.) On the other hand, the topic of "school discipline" has not been treated explicitly in several texts on methods of teaching. This chapter is intended to represent a middle position. It is recognized that the teacher must be skilful in managing a class, but the writer believes that most of the investigations of causes of failure among teachers have been misleading because appropriate measures of failure were not obtained. Usually "failure" has meant failure to maintain good discipline, i. e., keep good order. The achievements of the students were not given much weight in estimating the degree of success of a teacher. This was probably due to the fact that achievements tend to be intangible while good order is observable.

The reader who desires a more extended discussion of school discipline should read one of the following: BAGLEY, W. C.—*School Discipline*. New York: The Macmillan Company, 1914. 259 pp. COLVIN, S. S.—*An Introduction to High School Teaching*. New York: The Macmillan Company, 1917, Chapters IV, V, VI, and VII. MOREHOUSE, FRANCES M.—*The Discipline of the School*. Boston: D. C. Heath and Company, 1914, 342 pp. PERRY, JR., ARTHUR C.—*Discipline as a School Problem*. Boston: Houghton Mifflin Company, 1915, 273 pp.

organization and discipline of the high school for which the principal and other administrative officers are primarily responsible. Hence, it will be necessary to introduce some consideration of these matters, but for the most part the discussion will be restricted to the problems for which the teacher is responsible.

Two general plans of conducting classes.—One general plan of conducting classes is suggested by the word “recitation” which is generally used to designate the work carried on in the classroom. The students are seated according to a formal arrangement so that they face the teacher. The characteristic activity of the period is the reciting by the students in response to requests by the teacher. Although theoretically the other members of the class form an audience, the student reciting usually addresses the teacher and the listening of his classmates tends to be very perfunctory. Sometimes the teacher “lectures” to the class, which implies the request that the students trace his thinking. On other occasions the teacher attempts to have the class work in unison as in a drill or a development lesson.¹

A different plan of conducting a class is represented by the methods used in the laboratory. The characteristic feature of the laboratory method is that each student is engaged in doing an exercise assigned to him. It may be that other members of the class have been assigned the same exercise, but the several students work independently, each at his own rate. Sometimes a group of students work together on an exercise.

The laboratory method is employed in one phase of physics, botany, cooking, shopwork, and a number of

¹This paragraph is intended to describe “recitations” as they are usually conducted rather than to indicate the activities the teacher should endeavor to stimulate and direct.

other subjects. Many authorities advocate its extension to such subjects as algebra, history, and English,¹ but in the following discussion we shall assume that many teachers will continue to employ the "recitation method," or some modification of it. Much of the discussion will be applicable to both plans of conducting classes, and when a distinction should be made it will be indicated.

General requirements for efficient conduct of classes.—

It is obvious that the efficient conduct of classes requires the elimination of those conditions that hinder learning activity. The time consumed in such activities as taking the roll, distributing or collecting materials, passing of groups of students to the blackboard, and the like should be reduced to a minimum. The temperature, lighting, and other physical conditions should be conducive to learning activity. Disorder and other distracting conditions should be eliminated. However, a high degree of effectiveness in the conduct of classes is not to be attained by the elimination of negative conditions; positive or contributing conditions must be created. The more important of these conditions may be grouped under "capitalization of the group as an educative asset" and "maintenance of appropriate balance of instructional activities." The handling of students in groups has been looked upon as an unavoidable handicap in educating them, but there is now an increasing belief that **the** management of the class may be socialized so that the group will make positive contributions to the education of its members. Under the recitation method of conducting classes, frequently called "lesson hearing," there has been a tendency to overemphasize the measurement of achievement (diagnosis) and to neglect the other

¹The merits of this proposal will be considered later. See page 372 and Chapters XII, XIII, and XIV.

phases of the teacher's task. In some cases there has been an excess of motivation and occasionally a teacher gives too much direct assistance. It is obvious that an appropriate balance of the several phases of the teacher's task is essential.

Functions of the class period.—In considering how the teacher may conform to the general requirements in conducting classes it will be helpful to note the functions of the class period. In the first place, students should be afforded opportunities for engaging in appropriate learning activities under the immediate guidance of the teacher. Under the laboratory plan this function is prominent, but in the case of the recitation plan, it is necessary to devote a portion of the class period to stimulating and directing learning activities which are not carried on in the presence of the teacher. Hence, the recitation period serves a dual function. It affords an opportunity for learning under the immediate stimulation and direction of the teacher; it is also used as a means of stimulating and directing home study and the learning activities carried on in the library and study hall.

Conditions that interfere with learning activities.—Our ideas concerning the classroom conditions that are essential have undergone significant changes. Formerly the "good" teacher had his students trained so that they responded to signals and commands with military precision, and during a study period the degree of quietness expected was described as such that the dropping of a pin could be heard. It is now generally agreed that the military type of discipline is not essential for a high degree of efficiency and that it is only necessary to eliminate those conditions that interfere with learning activities. These conditions may be grouped under three heads.

1. *Physical conditions of classroom*
 - a. Ventilation
 - b. Temperature
 - c. Lighting
 - d. Seating
 - e. Equipment and its arrangement
 - f. General tidiness
2. *Distracting noises, movements, and other activities*
 - a. Whispering and other forms of communication
 - b. Moving about the room
 - c. Teasing and other forms of annoying other students
 - d. Showing off
3. *Waste of time*
 - a. Loss of time in getting started the first day
 - b. Lack of promptness in beginning and closing the work of a period
 - c. Employment of dictation when mimeographed or printed statements might be distributed
 - d. Time-wasting methods of distributing and collecting materials, taking the roll, etc.
 - e. Misplaced equipment, poorly planned demonstrations, etc.

The teacher's control of physical conditions.—The teacher's control of the physical conditions of the classroom is limited by the character of the building and its equipment, but usually the teacher can increase the efficiency of his instruction by giving attention to the items noted. He should observe the temperature and ventilation. An overheated room¹ hinders effective learning activity. In ventilating, drafts should be avoided. If the windows

¹The most desirable temperature will vary with the nature of the activity carried on in the room.

are equipped with shades, the teacher is responsible for their adjustment. The general tidiness of the room is largely under the teacher's control. Although attention to paper and other litter may be carried to an extreme, the teacher should insist upon the observance of reasonable rules. In addition to facilitating learning activity, he has an opportunity to contribute to the engendering of desirable patterns of conduct.¹

A well-disciplined school.—Bagley² has defined a well-disciplined school as "one in which the 'fashion' or 'mode' of good order, courteous behavior, and aggressive industry has been firmly established." This description also defines a well-disciplined class and represents the ideal which all teachers should attempt to realize.

The force of this definition comes in the phrase "fashion firmly established." When a type of conduct has become "fashionable" a majority of the members of the group, or at least those controlling public sentiment, approve of it. When we say that fashion has become "firmly established" we mean that the group as a whole not only approves of it but attempts to conform to it and is positive in its disapproval of any individuals who violate the fashion.

Bagley uses the phrases "good order," "courteous behavior," and "aggressive industry" to describe the types of conduct³ which should be fashionable in a well-disciplined school. "Good order" does not necessarily mean quiet. The essential concept is that no member of a class shall conduct himself in a way that will unduly interfere with

¹See page 329 f.

²BAGLEY, W. C.—*School Discipline*. New York: The Macmillan Company, 1914, p. 3.

³These may be considered general patterns of conduct. See Chapter X.

the activities of his classmates. Carrying on conversations even in whispering, passing notes, doing things to attract attention, and many other acts tend to disturb most students and hence should be prohibited. However, in some types of classroom work there will necessarily be many sounds. For example, in the laboratory and shop, students must move about the room and operate instruments and machines. On occasions the noise will be almost deafening, but there may still be good order. Even in the study hall and classroom there will be occasions when students will need to move about the room, and under certain conditions there may be communication between some members of the class. The "hum of industry" is compatible with good order. However, there should never be unnecessary noise or confusion or other distracting acts.

"Courteous behavior" refers to the conduct of students toward the teacher and toward each other. Replies to questions asked by the teacher and other statements directed to him should not violate the rules of good manners. Students should not be rude to each other. Criticisms should be made in the spirit of coöperation and helpfulness rather than for the purpose of finding fault. In short, the behavior of students should conform to the approved conventions of social intercourse outside of school.¹ Insolence, smart sayings, and similar acts are incompatible with courteous behavior. Incidentally, it may be noted that the teacher should treat his students courteously.

"Aggressive industry" overlaps the other two general patterns of conduct. When the various members of a class are aggressively engaged in learning activities, "good order" will almost always prevail and behavior is likely to be "courteous." The teacher who succeeds in securing

¹See the description of the ideal of courtesy on page 317.

aggressive participation in appropriate learning activities by all members of his class throughout the class period will seldom if ever have disciplinary troubles. Where aggressive industry is fashionable, students will not neglect their lessons.

Cheating in written work and other activities is not specifically included in Bagley's definition of a well-disciplined school. It is, however, a form of misconduct which is incompatible with a well-disciplined class. It is likely that Bagley would include it under "courteous behavior." In fact, cheating is an offense not only against the teacher but against the other members of the class as well. It is taking unfair advantage.

Conditions tending to make a well-disciplined school difficult to attain.—In our endeavor to appeal to the wide range of interests now represented among the students in our secondary schools, in our emphasis upon initiative and spontaneity on the part of the students, and in the development of extra-curricular activities, we have created new disciplinary problems. The brighter students can secure a passing grade and in some instances a standing distinctly above average with little or no study outside of the class period. As a result they devote a large share of their energies to extra-curricular activities, or they are idle and tend to become disorderly. In attempting to make school work interesting we have sometimes degraded it to the level of entertainment and frequently there has been a distinct lowering of standards. In not a few instances the general spirit of the school has approached the attitude that students are not expected to do things which they do not want to do. Certain conditions in the home and community have also tended to magnify the problem of classroom management.

Economy of time secured by a mechanized routine.¹—

Such phases of classroom management as the seating of students, taking the roll, distributing and collecting papers and other materials, passing from the room and the like should be reduced to an economical and fixed routine. Except in small classes each student should be assigned a definite seat in the room and a chart prepared to show the position of each member. After the first few days the roll should be taken by noting the empty seats. In the laboratory and shop a good arrangement of equipment and supplies will facilitate the starting of work at the beginning of a class period. The teacher should work out a convenient and economical plan of distributing and collecting papers and other materials. If papers are to be distributed, arranging them in conformity with the seating will reduce the time required and also minimize the confusion attending this activity. In collecting papers, teachers should ask that they be passed to the side or front of the room. The appointing of monitors to assist in the distribution and collecting of materials is frequently desirable. So far as possible the teacher should not leave a commanding position in the front of the classroom. The writer has observed classes become disorderly largely because in distributing or collecting materials the teacher went to the rear of the room so that his back was turned toward a portion of the class.

In passing from the room it is possible to require a definite order of marching in response to signals. The construction of some school buildings makes such a formal procedure highly desirable if not imperative, but usually it is

¹A more extended treatment of this topic is given by: PARKER, S. C.—*Methods of Teaching in High School, Revised Edition*. Boston: Ginn and Company, 1920, pp. 25-48.

not necessary to require a definite order of marching when the class leaves the room. The students, however, should not be allowed to crowd about the door and shove each other about. They should be as orderly as an audience leaving a church or other place of meeting. The class should not be permitted to leave their seats until the teacher gives the signal, but the teacher is under obligation to dismiss the class promptly at the end of the period. He should plan the work and watch the time so that there will be no occasion for hurry or confusion in dismissing the class.

A fundamental principle of classroom management is that all activities of the type described in the preceding paragraphs should be routinized, that is, done in the same way each time. Soon they will become largely habitual. This will tend to insure orderly conduct even when the teacher's attention is focused on other matters.

In certain phases of instruction it is desirable to approach a mechanized routine. Unless the assignment will grow out of the work of the day it should be made at the beginning of the period so that there will be no possibility of not having sufficient time to give the students a clear understanding of the learning exercises that they are to do. When short written tests are given frequently, it is usually wise to set apart a definite time for them. If the test is over previous work it should be given at the beginning of the hour; if it is based on the day's lesson it will usually be advisable to give it just at the close of the period. If written work is to be handed in it should be collected at the beginning of the hour and not left for the students to hand in as they pass out of the room. Such a practice will usually result in confusion. Unless the teacher desires to call attention to certain items in test papers or other written ma-

terials which are to be returned, they should be distributed just before the period ends. This will avoid the inattention and confusion that frequently occur as a result of comparing grades and the marking of the papers.

The first day important.—In establishing a well-disciplined school the first day is important. It is the time to get the right start. The seating should be arranged, and so far as possible other routine factors should be carried on in the way they are to be done later. If this is not done the students will begin to form habits which will need to be broken up when the permanent procedure is instituted. The teacher should have a definite plan for the entire period and it should provide for student activity. In algebra he may ask the class to do exercises in arithmetic; in history he may ask questions relating to phases of the subject previously studied; in a foreign language the class may be asked to repeat certain words, phrases, or sentences in concert. The exercises should not be difficult. The important consideration is to stimulate wholesome activity in which all students participate.

Efficient stimulation and direction of learning a preventive of disorder and other disciplinary difficulties.—After providing for routinizing the activities noted in the preceding paragraphs, a teacher's attack upon the problem of managing a class should be directed toward securing active participation in appropriate learning activities by each member of the class. The saying that "an ounce of prevention is worth a pound of cure" is especially applicable in managing a class. Students who are actively engaged in appropriate learning activities do not have the time and usually lack the inclination to be disorderly. An idle student or one only passively participating in a learning activity is a potentially disorderly student. If he refrains from

committing disciplinary offenses it will be because he is afraid of the consequences or lacks ambition and initiative.

Effective motivation is of course essential, but it is equally important for the teacher to give each member of the class a definite opportunity to do something throughout the entire period. Some students will not respond to an opportunity to do, and direct stimulation will be required, but many students are inactive during a portion or all of the class period because the teacher fails to create opportunities for them to become active. In several of the school subjects the nature of the learning exercises is such that every member of the class can be assigned work promptly.¹ In algebra and geometry the students may be directed to begin on the first exercise which they have not done or with which they have had trouble. Another device is to prepare a number of cards with exercises written on them. These may be distributed to the students as they enter the room or when the teacher is ready to have the class begin work. This plan may also be applied to problems in physics and chemistry. With modifications it can be used in foreign languages and history. In the laboratory and shop the assignments can be quickly made if the teacher has planned his work properly. In typewriting and some other commercial subjects it is also relatively easy to set every member of the class to work promptly.

When the class period is to be devoted to the answering of questions asked by the teacher or to listening to informal lectures by him, it is difficult to secure aggressive industry on the part of each member of the class.² When a

¹This is made easier when the work is laboratorized. See page 372f.

²In spite of this difficulty, it is probable that provision should be made for some recitations in practically all high-school subjects. It is also necessary to give some attention to the direction of learning activities engaged in outside of the classroom.

thought question is asked some students will not be stimulated to think. Since the process of thinking is not accompanied by an observable outward manifestation, it is difficult or impossible for the teacher to know whether a student is thinking about the question asked, unless he is obviously engaged in something else. The directions relative to asking questions apply here.¹ From the standpoint of securing a well-disciplined class it is important that the question be asked before the student is designated to answer it. Students should not be called upon in any regular order. Frequently it is desirable for the teacher to call upon a student when he observes that he is not giving attention to the recitation. After one answer has been given other students may be called upon to supplement it or to offer criticism. Sometimes a student may be asked whether he agrees with the answer given, or to give the answer which he has formulated for the question. No time should be wasted in repeating answers or in pursuing a student who answers unsatisfactorily. Fact questions should be asked rapidly, but when a question requires thinking, students must be given time to think. In no case should the work be allowed to drag. In foreign languages a sentence or paragraph may be indicated for translation with the request that all translate it. After an appropriate interval a student may be designated to give the translation. Other students may be asked to criticize this performance and suggest improvements.

Colvin² states three maxims which epitomize our discussion of classroom management:

¹See pages 259-260.

²COLVIN, S. S.—*An Introduction to High School Teaching*. New York: The Macmillan Company, 1917, pp. 62-7.

1. Begin each class exercise with vigor and promptness.
2. Strive to keep each member of the class busy during the entire period.
3. Have some system of holding every member of the class responsible for all that takes place during the class period.

Creating interest as a means of securing a well-disciplined class.¹—It is frequently stated that the teacher who succeeds in making his subject interesting will have few disciplinary troubles. This is true, but some teachers have misinterpreted “making a subject interesting.” They have considered creating interest as synonymous with entertainment and have attempted to amuse or entertain their students. Such attempts represent poor teaching and usually fail to secure a well-disciplined class. It is difficult for a teacher to entertain the same group of school children when they meet day after day. Appeals which were at first successful soon lose their potency. Students are quick to detect superficiality and they lose respect for a teacher who does not require that definite tasks be done. Interest is not opposed to effort. As a rule students enjoy intense mental activity, particularly if they are engaged in doing something which they can do reasonably well. The writer has observed classes in mathematics intensely interested in doing “abstract exercises.” Many teachers of Latin and even Greek succeed in making their subjects very interesting. They do not accomplish this by making the work easy or by the introduction of attractive charts or other devices which will interest the students, but primarily by creating opportunities for each member of the class to be active and by insisting upon high standards of work. Wrong methods of “making school work interesting” re-

¹It will be helpful to review the discussion of motivation in Chapter IV, especially pages 105–8.

sult in inferior teaching and will not prevent or cure disciplinary difficulties. In fact, such methods are likely to contribute to making a class disorderly.

The relation of personal traits of the teacher to classroom management.—A teacher's interest in his subject and in the task of teaching is a potent factor in interesting students. Other traits also contribute to securing a smoothly running class. A teacher should at all times be courteous; otherwise he is not justified in insisting on courteous treatment from his students. He must be patient but at the same time firm. He must always be just. Students are quick to detect injustice and the adolescent boy or girl strongly resents it. Arbitrary requirements are frequently interpreted as unjust because the student does not see the reason for them. The teacher should be careful not to criticize unjustly. He should moderate his voice so that it will not be harsh or irritating to students. He should be dignified but not haughty. He should present an appearance of activity. For this reason it is wise for a teacher to stand before the class rather than to remain seated.

Detecting offenders.¹—Although a teacher's effort should be focused upon the prevention of disorder and other breaches of discipline through stimulation of participation in learning activities, he should be quick to detect offenders and prepared to deal with such difficulties as arise. The teacher should be observant of all that goes on in the classroom. So far as possible he should maintain a position which will command a direct view of each student. He should become familiar with symptoms of potential disorder and active forms of misconduct.

It sometimes happens that a teacher may be fully aware

¹A helpful discussion of "types of disciplinary problems" and "types of disciplinary control" is given by COLVIN, *opus cit.*, pp. 83-104.

that some offense has been committed but finds it difficult to ascertain the particular student or students involved. Usually a teacher is not justified in administering punishment to the class as a whole and for this reason it is necessary for him to identify the offender. He should make certain that he has located the offender before proceeding to administer punishment because most high-school boys and girls keenly resent being criticized or punished for things they did not do. It is better to allow a few guilty ones to escape than to punish innocent students.

When questioned in regard to offenses most high-school students will tell the truth in regard to their participation, and unless a student has the reputation of being untruthful a teacher should usually accept his statement as true. He should not encourage students to "tell" on their classmates unless the offense is a serious one and one which jeopardizes the good name of the class as a whole.

Correcting disorder in the classroom.—Good order is largely a matter of habit, and a fundamental law of habit formation is that no exceptions are to be permitted. Hence it is important that the teacher take note of any departures from the standards of a well-disciplined class and apply appropriate corrections. This does not necessarily mean that the offenders are to be punished, although there are occasions when some form of punishment is required.

We have already suggested that when a teacher observes a student who is not giving attention to the lesson or one who is beginning to be disorderly, he should call upon him to recite. When inattention becomes at all general a test or some other written exercise will usually serve as an effective corrective. The virtue of such a device as a disciplinary measure is that it creates a definite opportunity for activity on the part of each member of the class. The teacher

should always have a supply of paper and pencils on hand so that a written exercise may be assigned at any time.

Sometimes the cause for disorder is to be found in the teacher's procedure of handling the class. He may not start work promptly at the beginning of the period; he may permit students to interrupt his explanation or discussion and the responses of other members of the class with the result that their behavior is far from courteous; he may have formed the habit of using slang and trying to make clever remarks, thereby encouraging his students to do so. When a class tends to be chronically disorderly the teacher should carefully examine his methods of instruction and if any objectionable procedures are found they should be discarded immediately as the first step in correcting the disorder.

In dealing with a disorderly class the teacher should be tactful, fair, and courteous. He should make certain that he is judging the conduct of the class by appropriate standards. It is possible to make arbitrary requirements which are not necessary for effective learning. In fact, this is very frequently done with the result that the attitude of the students is that a teacher demands certain types of conduct simply because he is in a position to do so. This they are apt to resent. The teacher should cultivate a sense of humor but avoid becoming undignified. He should be patient but not procrastinating.

On occasions a teacher may appeal to the common sense of the class and their ideals of fair play. Such an appeal must be made tactfully and in the right spirit. It must not be a confession of weakness, and it must not constitute a threat. Colvin¹ describes two cases in which this method

¹COLVIN, S. S.—*An Introduction to High School Teaching*. New York: The Macmillan Company, 1917, p. 97.

was highly successful. In an ungraded school, the pupils were "trying out" the teacher and by the third day the class was beginning to be disorderly. After the teacher had commented upon the disorder, naming the offenders and their acts, she added, "Now I can be a pleasant teacher or a cross teacher. We can have a happy time this term, or we can have a miserable time; we can learn a great deal or we can learn little. Which shall it be?" A beginning high-school teacher who found his class becoming very disorderly appealed to his students: "Don't you think it is pretty mean of you fellows to treat me in this way? You know I am a new teacher. I think you ought to be fair and give me a chance. Remember you are thirty-five to one." Both of these appeals were effective, but the success of these two teachers probably depended more upon the spirit in which the appeals were made rather than upon the particular words spoken.

Dealing with individual students.¹—At least occasionally practically all teachers encounter the "inattentive student," the "disorderly student," the "student in rebellion," and even the "vicious student." Such cases should be dealt with promptly and effectively. If this is not done, the disorder is likely to spread to other members of the class. In dealing with individual students it becomes necessary for the teacher to adapt his procedure to the mental and emotional characteristics of the offender. Some students are very sensitive and a reprimand given before the class constitutes a very severe punishment. In such cases it is unwise to employ the more severe measures that

¹The attention of the reader is called to the fact that here we are considering only the disciplinary problems of the teacher. Those which come within the province of the principal and other administrative officers are intentionally omitted because they more properly belong in the course on secondary-school administration.

would be appropriate in dealing with students who are less sensitive. Some students appear to court certain forms of punishment for the distinction it gives them. In such cases the punishment will not be effective; it merely aggravates conditions. There are some offenses, usually minor in character, that should be dealt with at the time when they occur. The teacher, however, should not act too hastily and should never lose his temper. As we have already pointed out, it is better that a few guilty students escape punishment than that injustice be done to anyone. If a student is observed giving his attention to something not pertaining to the work of the class the teacher should deal with the matter at once. If the nature of the work does not permit calling upon him to recite, admonition or even a reprimand is in order. If it is a student who is usually attentive it will generally be sufficient to let him know that his inattention has been observed. Some teachers find it very effective merely to stop the work of the class until those who are engaged in whispering or doing other things come to the realization that they are responsible for the delay. The inattentive student may be assigned to a special task. When inattention threatens to become chronic the teacher should inquire into the basic cause and attempt to remove it. In many cases the teacher will find that he has failed to be effective as an instructor.

Many cases of inattention and even other disciplinary difficulties are due to the fact that the work does not appeal to the student as a challenge to his ability. Either the teacher is not sufficiently skilful in creating opportunities for participation in learning activities, or the work is not properly adjusted to the individual members of the class. The remedy for such a situation may require a modification in the student's program of studies. In case it is the

policy of the school to maintain "fast," "average," and "slow" sections such students found in the slow or average sections should be transferred to one moving more rapidly. Sometimes students are inattentive because they have found the work beyond their capacities and as a result are discouraged. Here again the correction may require some readjustment of the student's program.

A teacher may find it helpful to change the seating, particularly when two or more students are involved. Students who are intimately associated outside of school are sometimes tempted to carry on conversations or even to engage in positive disorder when they are placed in adjacent seats. Many teachers have found it helpful to ask students who are giving trouble to do some special task, such as preparing material or apparatus for the class, serving as monitors, or even making a special report on an assigned topic. In some instances they have been asked to mark test papers. The effectiveness of this procedure depends upon the tactfulness of the teacher in making the request. He should endeavor to make the student feel that he is being honored or that he is doing the teacher a favor.

When in accord with the policy of the school a disorderly student may be asked to leave the room. In applying this punishment the teacher's attitude should be that the student's presence is harmful to the class and that the student has forfeited his privilege of participating in the recitation. In several cases that have come under the writer's observation the student voluntarily approached the teacher with an apology for his conduct. Of course when a student responds in this way the apology should be accepted in the spirit in which it is given. The general policy of some schools does not make this type of punishment feasible and it will not usually prove effective when

the student is in rebellion or is vicious. If employed too often it will lose its effectiveness and tend to create the impression that the teacher is acknowledging his inability to control his class.

In some schools a common form of punishment is to send the student to the principal. The wisdom of this plan is doubtful. The teacher's action is likely to be interpreted as an acknowledgment of his inability to control his class and the students promptly lose respect for him. However, a teacher, particularly one lacking in experience, should not hesitate to seek the advice of the principal and of other teachers in regard to methods for dealing with disciplinary matters.

When it is not desirable to deal with an offense at the time it occurs in the class the teacher should usually have a private interview with the student involved. He should be given an opportunity to state his side of the case and the teacher should seek the fundamental causes for the misconduct. Occasionally there are students who are inattentive because they are not getting sufficient sleep due to outside work. Arising early to distribute morning papers is one type of work which is likely to prevent sufficient rest. In rare instances unhappy home life will be found responsible for poor school work and disciplinary offenses. A student's physical condition is sometimes a cause. Talking things over will frequently result in a mutual understanding between the student and his teacher which will tend to prevent subsequent occurrences of the offense. The teacher should not talk too much. He should not lecture the student nor threaten him. He should be fair and meet the student halfway.

Extra school work not an appropriate punishment.—A very common form of punishment with some teachers is

the assignment of extra school work.¹ This is wrong. The presumption of the school is that students should be interested in school work. At least they are expected to acquire an interest in it. When the doing of additional exercises or the preparation of a special paper is assigned as a punishment it is implied that both the teacher and student recognize that such work is disagreeable. The teacher therefore forces himself into an indefensible position by insisting in his teaching that the student should find the school work interesting and then implying that it is disagreeable by using it as a form of punishment.

Relation of punishment to the offense.—Punishments may be classified as (1) natural and (2) artificial. Rousseau, Spencer, and others have pointed out that violations of sound principles of conduct will naturally result in consequences which constitute natural punishments for the offense. For example, if a person violates rules of health his consequent illness constitutes a punishment. When the boy Emile broke a window in his room he suffered the consequences of being cold.

Artificial punishments are those imposed by the teacher. They are inflicted not as a natural consequence of the student's act but because the teacher is empowered to inflict them. Unfortunately some students come to consider artificial punishments as a personal matter between them and the teacher. Such students resent punishment and come to think of the school as a struggle between them and the teacher in which each tries to be the victor. Their chief ambition is to put something over on the teacher. Under such conditions punishment loses much of its value.

¹The reader should not confuse the assignment of extra school work as a punishment with requests to do certain things as a favor to the teacher. See page 362.

In general this unfortunate condition can be avoided by the teacher who recognizes appropriate standards of conduct. Some teachers unfortunately insist upon standards of conduct for which there is little or no justification. Students should not violate any of the conventions of social intercourse. They should be polite to each other and to the teacher. Good order should be maintained in so far as it is essential to effective learning. To establish arbitrary standards other than those which can be justified is undesirable and will tend to engender a spirit of rebellion in many students.

A teacher can still further minimize the artificial character of his punishments by making clear to the offender why punishment is being inflicted. This does not mean that it is necessary to convince the student that he deserves punishment and that the particular penalty is a just one, although this will usually follow as a result. Furthermore, punishments should be appropriate to the offense. This does not mean that they should be the natural consequence but that they should not be more severe than the offense justifies. In so far as possible it is wise to approach the natural consequences.

Punishment for failure to do school work.—In dealing with failure to do school work the teacher should distinguish between those students who try but fail and those who do not try, either because they are indifferent or because they deliberately decide that they will not attempt the learning exercises assigned. In the case of students who try but fail the need is for more effective direction of their learning activities rather than for punishment. There will be some who claim that they have tried but who have not been sufficiently persevering. In such cases the teacher

should endeavor to secure a stronger motive and to build up ideals which will insure continued effort even in the face of difficulty.

When students do not try to do the assignments the teacher should first exhaust his resources for securing a motive which will furnish the impelling power necessary to secure action. When his efforts in this direction fail it becomes necessary to acknowledge defeat or to inflict some punishment. Some teachers have found it very effective to keep students after school hours, justifying their action to the students on the grounds that, since they had failed to apply themselves during school hours or to give adequate time to their work at home, it was only right and just that they should remain after school and make up such wasted time. This type of punishment will not work with all students and in some cases it would be entirely unjust to apply it. It is also somewhat unsatisfactory because it tends to punish the teacher as well as the students, since it will practically always be necessary for the teacher to remain in order to supervise the work.

Another type of punishment which is very frequently employed is to withhold certain school privileges. A student may be prohibited from participating in school athletics and other activities in which the school is represented. Some teachers have found it effective to assign the student a seat in one corner of the room apart from the remainder of the class, thereby denying him the privileges of class membership.

Types of punishment.—Several types of punishment have already been referred to and commented upon. We may, however, enumerate the more frequently used punishments with a brief statement concerning them.

I. *Corporal punishment.*—This type of punishment has

been used extensively in the past but it is now prohibited in many schools and public sentiment is against it in most communities, especially for high-school students. Where it is permitted it should seldom be employed by the teacher, at least not without consultation with the principal of the school. It is more appropriate for general school offenses than for those with which the teacher has to deal. Its use should be avoided whenever possible, but it may be thought of as the last resort in those schools where it is permitted.

II. *Keeping after school*.—Keeping after school is a very common form of punishment but may easily be abused. It is appropriate when students have wasted time during school hours, since it may be justified on the grounds that they are merely making up time which they took from the regular school period.

III. *Dismissal from class*.—Dismissing a student from a class for the remainder of the period or for a longer time proves effective in many cases. However, it should not be used extensively and in general it is not wise to employ it except in those instances where the student's absence from the class can be justified as beneficial to the remainder of the group.

IV. *Denial of privileges*.—The denial of privileges is a type of punishment which is frequently very effective. If it is used judiciously teachers will find it a potent means of dealing with many disciplinary offenses.

V. *Assignment of extra school tasks*.—As we have already pointed out, the assignment of extra school tasks should not be used as a punishment; to do so places the teacher in an indefensible position. Students should be encouraged to like school work rather than to think of the doing of it as a disagreeable thing.

VI. *Isolation, suspension, and expulsion.*—Isolating a student from other members of the class, either by not allowing him to participate in the work of the group or by suspending him from the class, should be employed judiciously. Some students would like nothing better than to be excused from the class. A student should not be expelled from a class until the principal gives his approval and then only for very serious offenses.

VII. *Reproof.*—Reproving a student is very effective in the case of minor offenses, especially if the student is at all sensitive. However, the teacher should be very tactful in reproofing a student and make certain that there will be no residue of resentment or ill feeling. In many cases it will be sufficient to call the offender's attention to the fact that he has offended or that he has violated some requirement of a well-disciplined class. The teacher should be very careful not to say things that he will regret afterward. In general, a teacher should avoid ridicule, and sarcasm should be used very cautiously.

VIII. *Requiring an apology.*—Requiring a student to make an apology to the teacher or to the class, if the offense is against them, is frequently a very severe form of punishment. It is, however, an appropriate penalty for many offenses and if good judgment is exercised in employing it the teacher will find it very effective, provided that the student makes the apology in the proper spirit. An apology which is not made in the proper spirit fails of its purpose.

IX. *Appeal to parents.*—Parents may be appealed to when they are in position to give direct aid in correcting the fault in the student's conduct. They should not be appealed to merely in order to have the student thrashed or otherwise punished. In cases where a student is failing to

do the learning exercises assigned for home study, an appeal to his parents is appropriate and will frequently be very effective. In matters of discourteous conduct an appeal is also appropriate. In employing this form of punishment the teacher should be careful not to appear as acknowledging defeat.

Capitalizing the group as an educative asset.—In beginning this discussion of the management of a class the reader's attention was called to the fact that a high degree of efficiency in the conduct of classes could not be attained merely by eliminating conditions that hinder learning. We turn now to a consideration of the positive factors of classroom management. Socialization of the management of classes is only one phase of a comprehensive trend in the conduct of our schools. Hence, in the following discussion there will necessarily be some reference to provisions for individual differences, project method, modification of education objectives, and the like, but the first two of these topics will be considered explicitly in the following chapters.

Under the traditional plan of conducting classes, exercises are assigned by the teacher; students are seldom given an opportunity to ask questions or to propose other learning exercises. Consequently initiative is discouraged; the students assume no responsibility for their education; they consider the teacher responsible not only for assigning exercises but also for suggesting how they are to be done and for rendering assistance when difficulties are encountered. In doing the assigned exercises and especially when responding to test exercises, the typical student attitude is one of subservience to the teacher. His immediate aim is to please the teacher rather than to do the exercises correctly. A similar attitude is maintained with reference

to the management of the class. They consider rules and requests to be idiosyncrasies of the teacher. They do not recognize that rules are essential and that assignments furnish a basis for educative activity. In order to correct this student attitude, it is proposed that the students have a part in managing the class and in planning the activities in which they engage. In addition to facilitating the attainment of objectives in school subjects, the socialization of the management of classes is expected to contribute to the engendering of the general patterns of conduct commonly designated as initiative, self-direction, student responsibility, and the like.

In some schools the socialization of the management of classes has been attempted by the introduction of formal plans of class organization; in other cases the traditional plan has been retained with only minor modifications and the socialization attained by creating appropriate student attitudes. Among the formal plans is the organization of the class as a city council, state legislature, or other adult deliberative body. Sometimes the class merely elects a chairman and secretary or is organized in committees. A less formal plan is the appointment of a student to conduct the recitation, the teacher becoming a member of the class, or merely an interested observer. The teacher may retain charge of the class and permit a student to ask questions and designate members of the class to answer them. The immediate purpose of such devices is to stimulate student responsibility for the activities of the class period and self-direction in performing them. When a student "recites" to the class, he is likely to feel some responsibility for contributing to work of the period and his classmates are apt to recognize their responsibility for evaluating what is said. The student is endeavoring to win the esteem of his

classmates rather than to satisfy the arbitrary demands of the teacher.

These teacher and student attitudes may be and often are secured without any formal plan of class organization. They are approached when the teacher stimulates discussion among the members of the class, even though he remains in charge of the class.

Social approval as a basis of motivation.—This topic has been referred to in connection with Bagley's definition of a well-disciplined school. (See page 348.) The immediate aim of the typical student under the traditional plan of conducting classes is to please the teacher. He has this purpose because it is fashionable. Usually the approval of classmates makes a stronger appeal to students than the approval of the teacher. The writer recalls a class which proposed the giving of a play. When approached in regard to the matter, the principal of the school expressed sympathy with the project but raised the question of the effect upon the regular class work of those who participated in the play. The members of the class promised that their school work would not suffer and although the preparations for the play made heavy demands upon their time, their regular class work was done promptly, in some cases more promptly than formerly. "Doing assignments" had become fashionable.

Many teachers succeed in securing social approval of high standards of work, promptness in handing in written reports, making contributions, class discussions, and the like. Their procedure usually involves calling attention to the things for which approval is desired. For example, if a student makes an unusually good report, the teacher may ask the class what they think of it and why they consider it meritorious.

Laboratory method as a type of socialization.—The laboratory method approaches the conditions of life outside of school more nearly than does the recitation method. Hence, a number of attempts to socialize classroom work have involved laboratorizing it. The Dalton Plan is one of the most widely known. The essence of this plan appears to be the formulating of a series of assignments, sometimes called contracts, comparable to the list of laboratory exercises provided by a manual.¹ The following description relates to the introduction of the Dalton Plan at the beginning of the second half of the school year:

Assuming that half the year's work has been done, the teachers of each department made out in fairly general terms a schedule covering the content of their courses for the remainder of the year and divided the schedule into five portions, each representing the standard amount of ground to be covered in one month. On the monthly bulletin that amount was divided into four weekly portions. The monthly bulletins were then posted on the wall of each of the respective departmental rooms. Each card had a characteristic color denoting the year group in which the various students were enrolled. Any supplementary assignment deemed by the instructor desirable for interpreting the more general assignment of the month was from time to time posted and distinguished against a background of appropriate color. Each student was issued a monthly individual card of the same color and size; on one side spaces were provided in which he copied from the departmental bulletin his assignments for the

¹The Dalton Plan will be considered as a means of individualizing instruction in Chapter XIII. For an extended description see: PARKHURST, HELEN.—“The Dalton Laboratory Plan.” *The Twenty-Fourth Yearbook* of the National Society for the Study of Education, Part II. Bloomington, Illinois: Public School Publishing Company, 1925, pp. 83-94. Also, by Miss Parkhurst, *Education on Dalton Plan*. New York: E. P. Dutton and Company, 1922, p. 278. DEWEY EVELYN.—*The Dalton Laboratory Plan*. New York: E. P. Dutton and Company, 1922, p. 173. ROBBINS, CHARLES A.—*The Socialized Recitation*. New York: Allyn and Bacon, 1920, 100 pp. UNDERHILL, R. I.—“The Scarsdale Application of the Dalton Plan of Individual Instruction,” *The School Review*, 33:48-56, January, 1925.

month in his several courses. The other side was divided vertically into columns with the title of the courses at their heads, and horizontally into twenty spaces representing the number of standard days' work in the monthly job. Here the student indicated his estimate of his progress by means of a vertical line drawn in the proper subject column from bottom to top. When the line was complete over the twenty-day spaces, he was at liberty to present himself for examination in the monthly work of the subject. In a similar manner he estimated his progress in the other departments in which he was enrolled and took the respective examinations. During his month's work he could divide his daily attention among all departments or he might choose to concentrate on one subject, finishing the respective tasks in succession. When the card was complete with all marks, dates of beginning and finishing, and signature of parent, he presented the card to his group adviser, secured a fresh card, and was ready to attack the work of the next month.¹

Variations of the Dalton Plan.—There are many variations of the Dalton Plan, most of them designed to secure adaptations to individual differences. The following is a description of what is called the "contract plan" worked out for the teaching of *Ivanhoe*. No general assignment is made but four groups of exercises are given. The students earn a certain number of "lesson points" for each group, called a contract. Each student attempts as many contracts as he desires.

Contract D.—(Eight lesson points.) Mastery of this contract implies the ability:

1. To narrate the leading events in *Ivanhoe* in order;
2. To relate certain episodes in detail;
3. To point out the climaxes; and
4. To recognize the persons whose identities were concealed at first.

¹JACKMAN, E. D.—"The Dalton Plan," *School Review*, 28:688-96, October, 1920.

Contract C.—(Four to eight lesson points.) This contract deals with backgrounds of *Ivanhoe* and offers practice in organizing material for class presentation, drill in reference work and in recording sources. Suggested topics¹ are:

1. Feudalism.
2. Chivalry (knights, squires, pages, combats, etc.)
3. Stories of King Arthur and His Knights: H. Pyle.
4. Selections from "Gawain and the Green Knight" in "English Literature and Readings." Pace.
5. Life of King Richard.
6. The Crusaders.
7. Robin Hood Ballads (select three or four good ones).
8. Sherwood: Alfred Noyes.
9. Brief account of the making of the English language.
10. Biography of Sir Walter Scott.

Contract B.—(Six extra lesson points.) The aim of this contract is to make *Ivanhoe* more meaningful and interesting through some forms of expression in art and drawing.

1. Map of *Ivanhoe*-land, ground-plan of the lists of Ashby, and of Cedric's living room.
2. An original drawing in colors of one of the characters in *Ivanhoe*.
3. Ground-plan of a castle, Torquilstone or Coningsburg.
4. Drawings with explanations of drawbridge, moat, turret, dungeon, etc.
5. Drawing of an armored knight with the parts of the armor named.

Contract A.—Extra lesson points to be earned through dramatization. Scenes suggested are: Wamba and Gurth, *Ivanhoe* in Rowena's Boudoir at Rotherwood, *Ivanhoe*

¹The student is expected to choose only a limited number of these topics.

and Isaac at Rotherwood, Gurth and the Outlaws, Gurth at Isaac's in Ashby, Rebecca Caring for Ivanhoe, The Black Knight at the Hermitage, Rebecca and Rowena.¹

Balance of instructional activities in the conduct of classes.—Although it is necessary to eliminate those conditions that interfere with learning activities and advantageous to capitalize the group as an educative asset and to introduce socializing forms of class management, high degrees of efficiency in teaching cannot be attained without maintaining an appropriate balance between the several types of instructional activities. Reciting affords the teacher an opportunity to evaluate the achievements of his students; the laboratory plan facilitates the directing of students as they engage in learning activities. A fundamental weakness of both plans is that teachers tend to over-emphasize the phases of instruction that the plan facilitates and to neglect the other phases.

When working under the recitation plan teachers frequently neglect the devising of learning exercises and the making of assignments as well as the directing of learning activities by means of suggestions and rules. In extreme cases their assignments are limited to statements of what is to be learned (objectives) or what amounts to the same thing, specifications of the pages of the text to be studied. When this is done the students are left to devise their own exercises which are very likely to be "requests to read and remember the textbook." A very probable reason for the success of the Dalton Plan, reported by many of those who have tried it or observed its operation, is that the teachers must plan learning exercises in writing, while under the

¹Adapted from: MILLER, H. L.—"The Contract Plan of Assignment and Some Implications Concerning Procedure," *Educational Administration and Supervision*, 12:238-50, April, 1926.

recitation method they frequently neglected this phase of their task.

LEARNING EXERCISES FOR THE READER

1. Discuss the relation of motivation to classroom management. Review Chapter IV before answering this question.

2. Does the Dalton Plan facilitate or hinder securing an appropriate balance of learning activities? Why?

3. From the standpoint of learning activity, what are the essential differences between "recitations" and "laboratory work"? See page 344.

4. What types of controls of conduct does Bagley include in his definition of a well-disciplined school? See page 348.

5. Describe "aggressive industry" as a general pattern of conduct. See the descriptions of general patterns of conduct given in Chapter X.

6. Distinguish between natural and artificial punishments. To what extent may natural punishments be employed in the high school?

7. Under what conditions is a teacher justified in punishing a student for failing to do school work?

8. "Unless the class is reasonably attentive and docile, nothing worth while can be accomplished, no matter how efficient in other respects the teacher may be." (COLVIN, S. S.—*Introduction to High School Teaching*, p. 59.) Do you agree with this statement? Give your reasons.

9. "It is a paradox of the well-disciplined school that discipline is conspicuous by its absence." (BAGLEY, W. C.—*School Discipline*, p. 1.) Explain the meaning of this sentence.

10. "Probably few classes in the high school are more than 'fifty per cent efficient.' Pupils are not really at work more than half of the time." (COLVIN, S. S.—*Introduction to High School Teaching*, p. 128.) Does this statement agree with your experience as a high-school student and with your observation? What are some of the most effective ways of eliminating waste in the classroom? Are laboratory periods likely to be more efficient than recitation periods? Why?

CHAPTER XII

ADAPTING INSTRUCTIONAL PROCEDURES TO INDIVIDUAL DIFFERENCES

Teachers have been aware that usually the students belonging to a given group (class or grade) differ in capacity to do school work, but the construction of general intelligence tests and other instruments for measuring mental traits has focused attention upon individual differences. In addition the need for making appropriate adaptations to existing differences has been augmented by certain changes in our concept of the function of the secondary school and by the phenomenal increases in the number of boys and girls who are now continuing their education beyond the eighth grade. Formerly the students attending high school constituted a relatively homogeneous group in respect to their capacity to do school work and the other traits affecting their success. In 1890 it is probable that not more than one in ten of the children reaching their teens in the United States entered a secondary school. In general these students were from the higher levels of intelligence. Their dominant interest was preparation for college and it was characteristic of them to like school work. During the period from 1890 to 1918 the total population of the United States increased from 62,000,000 to 105,000,000 but the enrollment in secondary schools increased from 298,000 to 1,804,000. It has been estimated that at this later date there were about three and one-half times as many children entering high school as in 1890.

Much of the increase in enrollment has come from the lower levels of intelligence.¹ Preparation for college is no longer the dominant interest of those attending high school and many desire to prepare for some occupation. Some are attending primarily because of the pressure of public sentiment in favor of secondary education or because they have not passed beyond the limit of compulsory attendance.

Problems created by individual differences.—The existence of differences in capacity to learn among high-school students and acceptance of the principle that efficiency in secondary education requires adaptations to these differences create a number of problems. In this chapter four are considered:

1. What are the nature and the magnitude of the significant differences that exist among the members of typical groups of students?
2. What results are desired from adaptations of instructional procedures to individual differences?
3. How may the teacher ascertain the nature and magnitude of the individual differences that exist among the members of a class?
4. What adaptations of instructional procedures should a teacher endeavor to make?

Types of significant differences among high-school students.—The evidence now available indicates that the individual differences with which the high-school teacher must deal are due in part to inherited characteristics. This condition is sometimes described by saying that some persons are "born long"; others are "born short." How-

¹THORNDIKE, E. L.—"Changes in the Quality of the Pupils Entering High School," *School Review*, 30:355-59, May, 1922.

ever, by the time boys and girls enter the high school, their inherited differences have been combined with other differences. A student's capacity to learn in the field of a given high-school subject is a composite of (1) inherited mental traits sometimes called "intellect" or native ability; (2) acquired knowledge of the general information type, sometimes called apperceptive mass; (3) prerequisite tools of learning among which ability to read silently is the most important; (4) certain general patterns of conduct such as "study habits," interests, and "will to learn"; and (5) physical condition and environmental factors such as amount of sleep, facilities for home study, and extra-curricular activities.¹

Although the available evidence relative to differences in native ability is fragmentary and in many cases indirect, certain tentative conclusions are accepted by a number of authorities. For example, certain ones maintain that inherited mental traits tend to persist unchanged. The approximate constancy of the I. Q. (intelligence quotient) is cited as evidence of this hypothesis.² Some authorities contend that a student's native mental traits place very definite limits upon his progress. According to this deterministic hypothesis a student possessing a certain native mental status is able to advance only so far along a scale of school studies arranged in order of increasing difficulty. Since the work of the successive grades represents a rough scale of this type, this hypothesis is usually expressed by

¹For a more analytical list of factors see: FLEMMING, CECILE WHITE.—"A Detailed Analysis of Achievement in the High School." Teachers College, Columbia University, Contributions to Education, No. 196. New York: Bureau of Publications, 1925, pp. 29-48.

²The writer is fully aware that "general intelligence" which is measured in determining the I. Q. is an undetermined composite of native ability and the effects of training.

saying that a student possessing a certain native intellectual status (commonly described in terms of his I. Q.) can complete the sixth grade, one possessing a slightly higher status can complete the eighth grade, and so on, only those possessing a relative high native intellectual status being able to complete a college course. Other authorities insist that the limitations are much less definite. They contend that, with the exception of the "very stupid," most of whom do not reach the ninth grade or even the seventh, the great majority of the students in our high schools possess sufficient native endowments to learn "the things necessary to a reasonably effective social life and that their progress in learning will depend chiefly upon the opportunities that are provided for them in the way of good schools and good teachers, the stimulus to systematic effort which comes from such schools and teachers and from the examples set by the home life and the community fashion, and the care that is exercised in preventing undernourishment, excessive worry, and an overplus of exciting distractions."¹ Although the high-school teacher should maintain an open mind in regard to the educational limitations due to inherited intellectual traits and be prepared to accept such additional evidence as may be discovered, the writer believes that the second point of view affords the better working hypothesis.

It has been asserted that the native elements of "capacity to learn" in school tend to be specialized rather than generalized and hence that a student who is able to do satisfactorily certain types of school work may be unable to do other types that in general are no more difficult. It is true that some "good" students do relatively poor work or

¹BAGLEY, W. C., and KEITH, J. A. H.—*An Introduction to Teaching*. New York: The Macmillan Company, 1924, p. 188.

even fail in one or more subjects. Scientific investigation indicates some variations of this type, but it is probably wise for the high-school teacher to adopt a conservative attitude and to be reluctant to explain unsatisfactory work of a "good" student by saying that he was "born short" in a particular subject.

Intelligence, widely used as a synonym for "capacity to learn," has been described as "intellect plus knowledge."¹ A similar concept of intelligence is implied in the statement that intelligence tests measure "acquired intelligence" rather than inborn mental traits and hence a student's capacity to learn is measured only indirectly by measuring certain samples of what he has learned.² The idea that a student's capacity to learn at a given time depends in part on what he has already learned has been emphasized in discussions of methods of teaching, especially in connection with the step of "preparation" in the Herbartian Five Formal Steps (see page 167) and the theory of apperception (see page 164).

The extent of a high-school student's acquired knowledge, especially knowledge of the general information type, is determined in part by his general environment.³ It is obvious that this environment, which includes home life, associations with others, both children and adults, travel,

¹HENMON, V. A. C.—"Intelligence and Its Measurement; A Symposium," *Journal of Educational Psychology*, 12:195, April, 1921.

²For typical statements see: COLVIN, S. S.—"Principles Underlying the Construction and Use of Intelligence Tests." *Twenty-first Year Book of the National Society for the Study of Education*. Bloomington, Illinois: Public School Publishing Company, 1922, p. 19. MONROE, WALTER S.—*The Theory of Educational Measurements*. Boston: Houghton Mifflin Company, 1923, p. 23.

³The relative effect of inherited mental qualities and environment is a debatable question. For a summary of evidence showing the effect of environment see: BAGLEY, W. C.—*Determinism in Education*. Baltimore: Warwick and York, Inc., 1925, especially Chapter VII.

and recreational activities, has been far from constant for all students who enter high school. The effects of a variable environment are frequently accentuated by the training that the students have received in the elementary school. Although in many cases the elementary school endeavors to neutralize the variable environmental conditions, it is seldom successful.¹ Children whose environment is deficient educationally frequently do unsatisfactory work in the elementary grades and the effect of "half learning" is accumulative. Hence the students whose learning a high-school teacher directs will differ in respect to the general information they have acquired, and this difference is one of quality as well as amount.

Range of individual differences.—If we assume that general intelligence tests yield measures of a composite of native mental traits plus acquired knowledge, the scores made by high-school students furnish an index of the magnitude of these two phases of the individual differences which teachers should recognize in directing learning. Table I presents typical facts.²

The total range of scores made on the Otis Group Intelligence Test by 192 IXB students was from 53 to 178. The highest fourth of the group including forty-eight students ranged from 145 to 178. In the lowest quartile the range was from 53 to 109. Similar wide variations are shown in each of the other grade groups. The facts presented in

¹The extent to which education operates as a "leveling-up" agency is a debatable question. There is considerable objective evidence which indicates that as our schools are now organized and conducted the training that children receive tends to increase certain aspects of individual differences. For a critical analysis of this evidence and an argument in favor of education as a "leveling-up" agency see: BAGLEY, W. C.—*Opus cit.*, Chapter VII.

²Taken from S. R. POWERS.—"Intelligence as a Factor in the Election of High-School Subjects," *School Review*, 30:453, June, 1922. Slight changes have been made in the form of the table.

Table I are for all of the students enrolled in one high school. The range for a single class will not be as great but unless the students belonging to a class have been selected on the basis of their general intelligence, the teacher may expect a range of 50 or more points.¹

TABLE I.—RANGE OF FOURTH AND FIRST QUARTILE SCORES OF GROUPS OF HIGH-SCHOOL STUDENTS. OTIS GROUP INTELLIGENCE TEST, ADVANCED EXAMINATION

GRADE	FOURTH QUARTILE		FIRST QUARTILE	
	Range	Number	Range	Number
IXB . . .	145-178	48	53-109	48
IXA . . .	146-178	17	56-112	17
XB . . .	154-195	23	74-114	23
XA . . .	158-187	12	23-114	12
XIB . . .	152-199	20	74-124	20
XIA . . .	164-187	10	82-130	10
XIIB . . .	171-209	26	88-137	26
TOTAL . .		156		156

Ability to read silently, ability to calculate, ability to express ideas in the English language, ability to write, and the like are used as tools of learning in the high school. Objective measurements of these abilities have demonstrated that high-school students belonging to the same grade differ widely with respect to them and that a considerable per cent of the students are distinctly handicapped in doing assignments in high school by their inability to read silently, to calculate, and to use other tools of learning.

¹A range of 50 points (from 75 to 125) on the Otis Group Intelligence Test is roughly equivalent to a range of 5 years of mental age.

Table II shows the range of ability to read silently in a typical group of ninth-grade students.¹ The distribution is based on the average of the scores made on two forms of the Thorndike-McCall Reading Scale and hence the variable errors of measurement are less than those involved in the scores from a single testing. The table shows that 42 or approximately one fourth of this group of ninth-grade students possess ability to read equal to or superior to the standard set for twelfth-grade students.² At the other extreme there are 3 students who read only as well as the average fifth-grade student and 76 others are below the standard for the ninth grade. The scores yielded by the Thorndike-McCall Reading Scale are general measures of ability to read, but diagnostic tests have revealed similar conditions. Students vary widely in rate of reading as well as in degree of comprehension. The errors made in comprehending the printed page reveal many idiosyncrasies.³

Similar differences in ability among high-school students have been reported by other investigators for the other tool subjects. Frequently a student who is deficient in one learning tool is also deficient in the others, but the degree of correlation between the several abilities is not perfect. Furthermore, deficiencies in the tools of learning frequently are combined with low native ability and a lack of general information. There are, however, exceptions to these gen-

¹This table is constructed from data given by IRION, THEO. W. H.—“Comprehension Difficulties of Ninth-Grade Students in the Study of Literature,” Teachers College, Columbia University, Contributions to Education, No. 189. New York: Bureau of Publications, 1925, p. 26. Irion presents data which show that this group is typical of the ninth grade.

²The norm 67 is taken as representing scores of 66 and above; 65 means from 64 up to 66; 63 means from 62.5 up to 64, etc.

³MONROE, WALTER S., and MOHLMAN, DORA KEEN.—“Errors Made by High-School Students in One Type of Textbook Study,” *School Review*, 31:36-47, January, 1923. See also the discussion of reading in Chapter VII.

eral tendencies due in some cases to poor vision or other physical defects or to inefficient training in the elementary school.

There is little objective evidence relative to differences in study habits, interests, and other general patterns of conduct that affect learning in the high school, but there appears to be no doubt that very significant differences

TABLE II.—SHOWING DIFFERENCES IN ABILITY TO READ SILENTLY AS MEASURED BY THORNDIKE-McCALL READING SCALE. (AFTER IRION.)

GRADE	STANDARD	DISTRIBUTION OF 161 NINTH- GRADE STUDENTS
XII	67	42
XI	65	15
X	63	11
IX	62	14
VIII	60	26
VII	57	32
VI	52	18
V	46	3
IV	4 ¹	
TOTAL . . .		161

exist. Many of the "better" students follow rather definite procedures in studying assignments, and the study of "poor" students is characterized by random and inefficient efforts.¹

¹For a report of one investigation of study habits see: MONROE, WALTER S., and MOHLMAN, DORA KEEN.—"Training in the Technique of Study." Bureau of Educational Research Bulletin No. 20. University of Illinois Bulletin, Vol. 22, No. 2. Urbana: University of Illinois, 1924, 66 pp.

The homes from which high-school students come differ with respect to occupations of parents, economic and social status, facilities for home study, and the like. Although the majority of high-school students come from a few occupational groups,¹ there is obviously much variation in the character of their homes.

Measurement of capacity to do school work.—The first tests for measuring intelligence could be administered to only one student at a time, but in 1917 Otis devised a general intelligence test which could be administered to a group of students at the same time. During the World War large numbers of the recruits were tested by means of a test very similar to the one which Otis devised. Since 1918 a number of group intelligence tests have been constructed for use in high school.²

When a general intelligence test is given under standard testing conditions a student's score is a general measure

¹COUNTS, GEORGE S.—"The Selective Character of American Secondary Education," Supplementary Educational Monographs, No. 19. Chicago: University of Chicago, 1922, 162 pp. GAISER, PAUL F.—"Occupational Representation in High School." *Educational Administration and Supervision*, 9:537-46, December, 1923.

Counts found that 55 per cent of the students in the high schools of four large cities come from four occupational groups: proprietors, professional service, managerial service, and commercial service. In a similar study of Wisconsin high schools, Gaiser reports somewhat different results, but when professional service is replaced by agricultural service we find that over 50 per cent of the students come from these four occupational groups.

²Among the group intelligence tests most widely used in high schools are the Otis Group Intelligence Test, Advanced Examination, the Otis Self-Administering Test, Higher Examination, the Haggerty Intelligence Examination, Delta 2, the Miller Mental Ability Test, and the Terman Group Test of Mental Ability. All of these are published by the World Book Company, Yonkers, New York. For a brief discussion of intelligence tests see: MONROE, WALTER S., DE VOSS, JAMES C., and KELLY, F. J.—*Educational Tests and Measurements, Revised and Enlarged*. Boston: Houghton Mifflin Company, 1924, Chapter IX. The topic is also considered in MONROE, WALTER S., and DE VOSS, JAMES C.—*Educational Psychology*. Garden City, N. Y.: Doubleday, Page and Company.

or index of his capacity to do school work.¹ The scores for all members of a class will not be perfectly accurate. Out of one hundred there are frequently as many as ten to thirty which are sufficiently erroneous to lead to distinctly misleading interpretations. When standard conditions do not prevail the proportion of seriously erroneous scores will be much greater. Furthermore, a general intelligence test measures *general* capacity to do school work, and a student's capacity to do the work in a particular subject may vary from his general or average capacity. Hence, the score made on a general intelligence test may not be a true measure of capacity to learn a particular subject. It should also be recognized that success in a given subject does not depend upon capacity alone. A student's effort and frequently his previous training are potent factors in determining his success. However, the scores yielded by general intelligence tests administered under standard testing conditions may be used as evidence of the magnitude of the individual differences and capacity which prevail in a given group of students and, with limitations, of the degree of capacity possessed by the several members of the group.

Other instruments for measuring capacity to do school work.—Since the study of most subjects taught in the high school makes large demands upon ability to read textbooks, standardized silent reading tests will yield vital information concerning the ability of students to do school work. The simplest test of this type is the Monroe Standardized

¹The standard conditions for a test are defined, or at least implied, in the directions which are to be followed in administering it. The specified time limits must be observed, but, more important, the directions must be followed in detail in explaining the test to the students in order to secure an equality of understanding of the exercises to be done and of effort in doing them.

Silent Reading Test III.¹ It can be administered to a group of students in five minutes and yields separate measures of the rate of reading and the degree of comprehension. The Haggerty Reading Examination, Sigma 3,² requires a much longer time to administer but yields more valuable information. Van Wagenen has devised separate tests to measure the types of reading ability which are required in the fields of general science, history, and literature.³ For mathematics and foreign languages in which there is little demand upon silent reading ability, other types of tests have been devised to measure the capacities of students to learn these subjects.⁴

The function of the tests just described, as well as of the general intelligence tests, is to secure a prediction of the probable future success of students in school work. For this reason they have been called prognostic tests. This descriptive term, however, is seldom applied to tests of general intelligence.

General purpose of adaptations of instruction to individual differences.—The existence of individual differences is now generally interpreted as creating a need for some adaptation of instructional procedures, but in order to have a rational basis for determining what variations should be made, it is first necessary to specify the general character of the results desired. Educators do not agree in

¹This test is published by the Public School Publishing Company, Bloomington, Illinois.

²This test is published by the World Book Company, Yonkers, New York.

³These tests are published by the Public School Publishing Company, Bloomington, Illinois.

⁴The Rogers Test of Mathematical Ability is published by the Bureau of Publications, Teachers College, Columbia University, New York City. The Wilkins Prognosis Test in Modern Languages is published by the World Book Company, Yonkers, New York.

regard to the most desirable immediate objectives for the various levels of capacity to do school work. Hence the following statements should be considered as representing a hypothesis. The teacher's general purpose in adapting instructional procedures to the individual differences existing among the members of a class¹ should be to control the differences in achievement so that they will be quantitative rather than qualitative. He should not endeavor to secure uniformity of achievement. No students should be neglected. The "bright" ones should receive attention as well as the "slow" ones. The teacher should never attempt to "level down," that is, restrict opportunities for participation in educative activities by the more capable students. In fact, the teacher should be zealous in providing learning exercises commensurate in number and difficulty with their capacity to learn. Some effort may be made to "level up" groups of students, but the teacher should avoid devoting a disproportionate share of his time to the slower ones.

It is generally agreed that it is "socially efficient" to provide appropriate learning exercises, stimulation, and direction for all children in the primary and intermediate grades. It is also generally agreed that it is not "socially efficient" to have all pursue graduate study, or even a college course. In other words, there appears to be general agreement that somewhere between the elementary school and the senior college it is "socially efficient" to have some

¹In this discussion we have assumed that the high school is efficient in guiding students in the selection of curricula and the elections of subjects within a curriculum. The topic of educational guidance is beyond the scope of this volume. For a discussion of it see: MONROE, WALTER S., and WEBER, OSCAR F.—*The High School*. Garden City, N. Y.: Doubleday, Page and Company. (To be published.)

selection of the more capable students occur.¹ Hence in the high school "effective adaptation of instructional procedures to individual differences" does not imply that there should be no failures in particular subjects or eliminations from the school. Some students, especially in the senior high school, will reach a stage in their educational careers where the law of diminishing returns operates to make further study of certain subjects unprofitable for them and for society. In a few cases it may be unprofitable for the student to continue his educational career.²

Adjustments to individual differences through the organization of the high school.—Through the organization of separate courses of study to prepare for business, college, a vocation, etc., and through the elective system, the students tend to be sorted into groups which are more homogeneous than would be the case if the narrower and required curriculum of a generation ago still prevailed. In an increasing number of high schools there is systematic guidance of students in choosing courses and subjects. In this way attempts are made to prevent students undertaking subjects in which it is likely they

¹The failure of students is evidence that the school is fulfilling a selective function similar to that of the preliminaries in a track meet. In the elementary school, failure is justified on the grounds that pupils who have not attained certain standards will be handicapped in doing the work of the next grade and hence the failure and the resulting non-promotion may be considered an administrative device to improve the organization of the school for instructional purposes. Selection in the elementary school is primarily a means of improving instructional conditions. In the graduate school of the university, selection is primarily for the purpose of determining which students shall be encouraged to continue their education.

²This statement is not intended to imply that in every class some students should fail. The argument of the paragraph should not be used as justification of a rule that in general a certain per cent of students should fail. It simply means that the occurrence of failures is not conclusive evidence of a lack of adaptation of instructional procedures.

will fail because they do not possess sufficient capacity or because their preparation has been inadequate.

In a number of high schools still further adjustment to individual differences is being attempted by classifying the students enrolled in a given course, such as English composition, into sections, on the basis of their capacity to do the work of this course. Under this plan, if there are three classes in English composition there would be a slow section, an average section, and a fast section.¹ Such a plan of classification facilitates the adaptation of both the content of the course and the direction of learning activities. Certain objections have been made to the plan. This, however, is not the place to enter into a discussion of the merits of classifying students on the basis of their capacity to do school work. Our purpose here is to consider the procedures which the teacher employs in adjusting his instruction to the differences represented in his classes.²

The adjustments to individual differences which may be effected by the organization of the school will reduce the need for additional adjustment by the teacher, but homogeneous grouping will seldom result in classes whose members exhibit equivalent capacities to learn. Hence there will always be some need for adjusting instruction to the individual differences existing within a class. In schools where grouping is practiced there will be need for adjusting the instruction to the level of the classes that the teacher may have.

¹Other terms have been used to designate such sections.

²The grouping of students on the basis of their capacity to learn has been the subject of considerable controversy. For a summary of the principal arguments and a statement of the writer's position see: MONROE, WALTER S., DEVOSS, JAMES C., and KELLY, F. J.—*Educational Tests and Measurements, Revised and Enlarged*. Boston: Houghton Mifflin Company, 1924, pp. 436-53.

Relation of plan of conducting a class to adaptation of instruction to individual differences.—In Chapter XI, page 344, two general plans of conducting classes were described. The laboratory plan facilitates adaptation but it is also possible under the recitation plan. Usually high-school students are expected to engage in learning activities outside the classroom as well as during the recitation period. These activities are almost wholly individual and hence afford many opportunities for adaptations to individual differences.

Basic types of adaptations of instructional to individual differences.—A survey of current practices relative to adapting instructional procedures to individual differences would reveal a variety of "plans," but there appear to be only three basic types of adaptations: (1) coaching lag-gards as a means of supplementing regular class instruction, (2) class organization maintained and assignments differentiated (varied) to suit the needs and capacities of individual students,¹ (3) replacing class instruction by individual or laboratorized instruction. The "plan" employed in a given high school may combine two or even all three of these basic adaptations. In addition a "plan" usually includes administrative procedures and devices to facilitate its operation. For example, when assignments are varied some system for recording the progress of the several members of the class is needed and some schools have evolved a rather intricate system of job-sheets and progress records.² The merits and limitations of each of

¹Adaptation of instruction to individual differences is frequently combined with other procedures designed to make the school more efficient. For example, we often find modifications of the curriculum combined with differentiated assignments or individualized instruction. We are concerned here only with the adaptations of instructional procedures. See page 371f for discussion of socialized recitation. Supervised study is considered in Chapter XIII.

²See the description of the Dalton Plan on page 372.

these three basic adaptations will be noted in connection with the following descriptions.

I. *Coaching laggards*.—The coaching of laggards represents a type of adjustment of instruction to individual differences which probably was introduced soon after students began to be taught in classes. Students doing unsatisfactory work were given special attention, sometimes being “kept in” after school. However, Superintendent Kennedy of Batavia, New York, is generally credited with initiating the coaching of laggards as a systematic school policy.¹ In 1898 he assigned a second teacher to the larger classrooms in his system to look after the needs of individual pupils. Later the plan was extended to all rooms and gained considerable popularity as a means of coaching the laggards.

Essentially the same type of adjustment to individual differences is represented by such supervised study procedures as “study coach” and “conference plan.”² A variation of “coaching laggards” is represented by “diagnosis and remedial instruction” which has been emphasized since standardized tests have been available for diagnosing the achievement status of the members of a class.

The purpose of “coaching laggards” is to “level-up” the class, i.e., to bring those whose achievements are unsatisfactory up to a satisfactory level. The plan does not include any adaptations of instruction to the “brighter” students. In fact, increased attention to the laggards frequently has tended to deprive the more capable students of adequate instruction and hence some leveling-down has resulted.

¹BAGLEY, W. C.—*Classroom Management*. New York: The Macmillan Company, 1907, pp. 214-23.

²HALL-QUEST, A. L.—*Supervised Study*. New York: The Macmillan Company, 1916, p. 98 f.

Furthermore, "coaching laggards" has usually been directed toward securing uniformity in quantity or scope of achievement, permitting the inevitable variations to be qualitative. In other words, "coaching laggards" does not emphasize mastery and prevent half-learning.

Although this type of adjustment of instructional procedures to individual differences is subject to significant limitations, the high-school teacher should usually give some special instruction to those students whose achievements are unsatisfactory. In doing this he should avoid devoting so much time to these students that others are neglected and, in general, "coaching laggards" should be considered as supplementary to other types of adjustments.

II. *Differentiated assignments.*—The principle of differentiated assignments is that the various members of a class are to be assigned learning exercises appropriate to their capacity and learning needs and that within certain limits each student is to be permitted to budget his time to suit his needs. All students are not expected to attain the same quantitative objectives. Hence, the employment of differentiated assignments implies the formulation of a system of differentiated objectives. The objectives on the lowest level are commonly designated as "minimum essentials" and specify the lowest degrees of achievement that may be considered satisfactory. For the students who are able to go beyond the minimum essentials, higher levels of achievement are defined as objectives.

Differentiation of assignments suggests the abolition of classes and recitations but it is possible to retain a class organization. By planning the work so that all members of the class are studying the same general topic, recitations may be retained and adaptation to individual differences

secured by differentiating the assignments for study outside of the recitation period.¹

In order to secure an efficient differentiation of assignments, it is essential that the levels of objectives and the corresponding learning exercises be planned with care. It appears to be generally agreed that the work should be planned in advance for the year (at least, for the semester) and that the assignments be issued in mimeographed or printed form for periods of not less than one week.² The assignment sheets for a course should be more than an outline of the work of the year. For each major division of the course an assignment sheet should specify, (1) the objectives to be attained (minimum essentials plus such higher levels as may be appropriate),³ and (2) learning exercises to provide a basis for the activity required as a means for attaining the several levels of objectives. These specifications may be arranged in the form⁴ shown on page 396. The abilities to be acquired include specific habits, knowledge, and general patterns of conduct. The general types of learning activity have been described in Chapter II, page 31. In adapting instruction to individual differences by means of differentiated assignments it is important that the teacher distinguish clearly between "abilities to be acquired" and "learning exercises to be done as a means of acquiring these abilities." He should carefully avoid giving his students the impression that the

¹Differentiation of assignments accompanied by the abolition of recitations is considered under the head of individualized instruction, p. 398 f.

²See Dalton Plan, p. 372.

³In all cases the objectives should be described in terms of abilities to be acquired. See Chapter III, especially page 66 f.

⁴Only three achievement levels are specified in this illustration but any number desired may be included.

SUGGESTED FORM OF ASSIGNMENT SHEET WHEN ASSIGNMENTS
ARE TO BE ADJUSTED TO INDIVIDUAL DIFFERENCES

Assignment Sheet for _____ to _____ 192
(date)

School Subject:

General Topic:

<i>Immediate objectives to be attained</i>	<i>Learning exercises to be done as a means of attaining the immediate objectives.</i>
FIRST ACHIEVEMENT LEVEL, MINIMUM ESSENTIALS, (Required for a grade of C.) Ability to 1. 2. 3. 4. 5.	1. 2. 3.
SECOND ACHIEVEMENT LEVEL. (Required in addition to first level for a grade of B.) Ability to 1. 2. 3. 4.	1. 2. 3.
THIRD ACHIEVEMENT LEVEL. (Required in addition to first and second levels for a grade of A.) Ability to 1. 2. 3. 4.	1. 2. 3.

doing of exercises is an objective. It is only a means to an end.

When the teacher's immediate purpose is to engender specific habits, as in certain phases of algebra, foreign languages, physics, and chemistry, drill is not justified after certain standards of attainment have been reached. Students who have attained the immediate objectives should be excused from such learning activities and assigned to other work, while the other members of the class are given additional training to bring their achievements up to standard.

It is not essential that the content of a course be the same for all members of the class.¹ The justification of this statement is based upon two considerations. The actual content covered by a student, except when it is a necessary prerequisite for future work, is not a matter of paramount importance. The omission of certain topics and exercises not included in the minimum essentials of a course will not produce serious gaps in a student's education. The more important consideration is that a student's achievements consist of what he has learned rather than the ground covered. Frequently students will profit more from doing well limited assignments than from a superficial participation in a larger number of learning activities. If we recognize the existence of individual differences in capacity to do school work, it follows that unless variations are made in the time devoted to learning or the more capable are not given an opportunity to work at full capacity, there must be corresponding variations in the achievements. This being the case, we are concerned with the control of these variations rather than their abolition. It

¹This principle is implied in the statement that differences in achievement should be quantitative rather than qualitative. See page 389.

is absurd to attempt to defend the thesis that we should expect equality of achievement.¹

When some members of a class are excused from certain drill exercises it is of course desirable that they engage in other learning activities which will be profitable to them. In such a subject as algebra it is relatively easy for a teacher to direct students engaged in several different learning activities. One group may be practicing one type of exercise at the board while another is engaged in other work at their seats. In history and other subjects involving much textbook reading special learning exercises may be assigned to the more capable students. In laboratory work additional exercises may be planned for those students who are capable of doing them. Many textbooks are prepared so that it is convenient to vary the amount of work assigned to the various members of a class. Certain exercises or topics are labeled as being for the more capable students.

If the principle that it is not necessary to require the same learning activities of all members of a class and that the number and difficulty of the learning activities should be adjusted to the capacity of the students is accepted, the resourceful teacher will experience little difficulty in devising appropriate assignments. He should, however, bear in mind that the criterion of successful teaching is not determined by the number and character of learning activities in which the students engage but by what they learn from these activities.

III. Individualized instruction.²—Until about a century

¹This statement is made relative to non-homogeneous classes. When students are grouped on the basis of their capacity to learn, a similar statement may be made relative to the different sections.

²Individualized instruction is essentially the same as laboratorized instruction. See page 372.

ago instruction was largely individual. "Simultaneous" or "mass" instruction did not become the typical method of teaching until after our schools became "graded," which occurred about the middle of the nineteenth century. It soon became obvious to critical observers that the graded system with the simultaneous instruction of classes, sometimes large classes, was not efficient and as early as 1868, W. T. Harris, Superintendent of Schools, St. Louis, Missouri, suggested a more flexible system of grading,¹ but the modern individualization of instruction dates from the work of Superintendent Preston W. Search at Pueblo, Colorado, in the early nineties.

Individualized instruction permits variations in objectives, learning exercises, and rate of progress as well as adjustments in the stimulation and direction of learning. In the most highly developed plans of individual instruction, the work is entirely laboratorized. Each student progresses at his own rate and the group assigned to a teacher is seldom assembled for a recitation or simultaneous instruction.² Theoretically each student can be as-

¹The "Elizabeth (N. J.) Plan," "Cambridge (Mass.) Plan," and other plans of classifying students for instructional purposes are not discussed in this volume. See: MONROE, WALTER S., and WEBER, OSCAR F.—*The High School*. Garden City, N. Y.: Doubleday, Page and Company.

²For extended descriptions of individualized instruction see: WARD, MARY A., CARTER, GRACE E., HOLMES, HILDA M., and ANDERSON, CECILIA.—"Individual System as Developed in the San Francisco State Teachers College." *Twenty-Fourth Yearbook* of the National Society for the Study of Education, Part II. Bloomington, Illinois: Public School Publishing Company, 1925, pp. 60-77. WASHBURN, CARLETON W.—"A Program of Individualization." *Twenty-Fourth Yearbook* of the National Society for the Study of Education, Part II. Bloomington, Illinois: Public School Publishing Company, 1925, pp. 257-72; Also by Mr. Washburne, "Goal Books in the Winnetka Schools." *American School Board Journal*, 63:32, December, 1921; "The Individual System in Winnetka." *Elementary School Journal*, 21:52-68, September, 1920; and "Educational Measurements as a Key to Individual Instruction and Promotions." *Journal of Educational Research*, 5:195-206, March, 1922.

signed learning exercises suited to his capacity to learn and to his learning needs.

Most of the attempts to individualize instruction have been confined to the elementary schools. Although additional difficulties will be encountered the plan can be extended to the high school. In fact, this was done in Pueblo.¹ However, the complete individualization in instruction appears to possess certain limitations. Group instruction is economical and many students are stimulated by other members of the class. This is particularly true with students who are encouraged to participate in a discussion or are required to make their reports to the class. In the judgment of many educators the complete abolition of class and group instruction would represent a distinct loss in the education of children.² However, there are many phases of the direction of learning which may conveniently be individualized. In laboratory and shop work the direction is largely individual. When learning activities are organized as a project there will be a good deal of individual direction on the part of the teacher. In English composition and other subjects in which written work is required the teacher's corrections and comments constitute individual instruction. Conferences with students provide an opportunity for instruction adapted to their needs.

When school work is laboratorized, as under the Dalton Plan,³ the instruction is usually largely individual, but adaptation to individual differences seldom is the only

¹SEARCH, P. W.—*An Ideal School*. New York: D. Appleton and Company, 1901. This volume gives the best discussion of the Pueblo plan.

²KILPATRICK, WILLIAM H.—“An Effort at Appraisal.” *Twenty-Fourth Yearbook* of the National Society for the Study of Education, Part II. Bloomington, Illinois: Public School Publishing Company, 1925, 273–86. See also the discussion of “Capitalizing the group as an educative asset” on page 369.

³For a description of the Dalton Plan, see p. 372 f.

purpose. As we observed in Chapter XI the socialization of the management of the class is generally considered an important function, and frequently an attempt is made to determine more appropriate objectives and to devise more efficient learning exercises. For example, in connection with the individualizing of instruction at Winnetka, Illinois, extensive studies have been made to determine objectives and a series of tests has been prepared.¹

Recognition of variation in learning activities in assigning school marks.²—When all students attempt the same work school marks are based largely upon quality, but if all members of a class are not expected to engage in the same learning activities it becomes necessary to consider quantity as well as quality. There is no generally recognized rule in regard to the relative weight which should be given to these two characteristics of students' work. Usually certain achievements are specified as minimum essentials. The student who attains these standards is given an average mark. In order to attain a higher mark it is necessary for him to do some supplementary work and the highest mark is given only to those students who do satisfactorily the maximum number of supplementary assignments.

¹WASHBURNE, C. W.—“Basic facts needed in history and geography; a statistical investigation.” *Twenty-Second Yearbook* of the National Society for the Study of Education, Part II. Bloomington, Illinois: Public School Publishing Company, 1923, pp. 216-33; and “Building a Fact Course in History and Geography.” *Twenty-Second Yearbook* of the National Society for the Study of Education, Part II. Bloomington, Illinois: Public School Publishing Company, 1923, pp. 99-110. MOHR, LOUISE, and WASHBURNE, C. W.—“The Winnetka Social-Science Investigation.” *Elementary School Journal*, 23:267-75, December, 1922. PENDLETON, CHARLES, and WASHBURNE, C. W.—“The Fact Basis of a History, Geography, and Civics Curriculum.” *Journal of Educational Research*, 8:233-38, October, 1923.

²HUGHES, W. H.—“Providing for Individual Differences with Respect to Instruction, Scope of Work, and Credit.” *Educational Administration and Supervision*, 5:343-56, October, 1919.

Dalman¹ has described a plan of adjusting the learning exercises in first-year algebra to the capacities of students. For each topic four sets of algebraic exercises were prepared and labeled C, B, A, and A+, in accordance with the system of school marks employed. These sets of exercises were used as tests on a topic which was first studied in the usual way. As soon as the teacher judged that one third or more of the class had acquired sufficient knowledge of the principles and skill in manipulation to pass the C Test, the easiest of the four, it was given to the entire class. This automatically divided the class into two groups: those who passed the C Test, and those who did not. The advanced group was directed to study exercises in the textbook which would prepare them for the B Test. The lower group continued their study of exercises of the type found in the C Test. After another interval the C Test was given again to those who failed to pass the first time and the B Test was administered to the advanced group. The class was then divided into three groups: those who passed the B Test, those who failed to pass it plus those who passed the C Test on the second trial, and those who failed to pass the C Test on the second trial. Again the instruction was adapted to the needs of each of the three groups. Dalman reports that the teacher developed a technique of handling students in groups, although the class still met as a class. After suitable intervals the A Test and the A+ Test were also given. A feature of the plan was the use of a chart posted on a wall of the classroom which showed the exact status of each member of the class. This device tended to stimulate each student to do his best.

¹DALMAN, MURRAY A.—“Hurdles—A Series of Calibrated Objective Tests in First Year Algebra,” *Journal of Educational Research*, 1:47-62, January, 1920. This plan was referred to in Chapter III as an illustration of stating immediate objectives.

This plan of adapting the school work to the individual differences represented in a class is perhaps more easily administered in algebra than in any other school subject but with modifications could be employed in foreign languages, physics, chemistry, and several other subjects. The following specifications for the topic of Area of Polygons is illustrative of what might be done.

- I. In order to receive a mark of *fair* the student was aware that he would have to make a mark of *excellent* in the mastery of the following: measurement of equal areas; fourteen propositions (theorems and problems) clearly specified; a statement of ten corollaries; at least two simple exercises illustrative of such of the propositions as carried applications; facility in the applications of the law of right triangles.
- II. In order to receive a mark of *good* the student was aware that he would have to make a mark of *excellent* in the following: all of I and in addition at least sixty exercises among those which accompany the propositions as they are developed. Certain exercises were marked for omission.
- III. In order to receive a mark of *excellent* the student was aware that he would have to make a mark of *excellent* in the following: all of I and II and in addition at least forty supplementary exercises listed in the back of the book (Wells and Hart) on "Areas of Polygons."¹

LEARNING EXERCISES FOR THE READER

1. What is the distinction between "leveling up" and "leveling down"?
2. What is the meaning of "homogeneous grouping?"
3. For some major topic in some high-school subject, formulate objectives for three levels of capacity to learn. See page 396.

¹MILLER, H. L., and JOHNSON, DOROTHY.—"Directing Study for Mastery," *School Review*, 30:777-86, December, 1922.

4. What is the distinction between quantitative and qualitative differences in achievement? Give two illustrations.
5. Compare the three basic types of adaptations of instruction to individual differences. Prepare a composite plan for a typical small high school.
6. What is the value of giving a general intelligence test? How should a teacher use the scores yielded by one?
7. Why should the high school fulfill a selective function?
8. What is the meaning of "half learning"? What are the most potent causes of half learning?
9. Prepare a list of possible causes of inefficiency in teaching. Which ones seem to be most potent?
10. Why is adaptation of instructional procedures to individual differences more important than formerly? Is it likely that its importance will continue to increase?

CHAPTER XIII

DIRECTING AND SUPPLEMENTING LEARNING ACTIVITY OUTSIDE OF THE RECITATION PERIOD

A changed concept of the teacher's responsibility.—Formerly teachers seldom employed procedures to insure that the student would understand clearly the exercises assigned and in many cases the assignment was limited to a general statement of what was to be learned. Rarely did a teacher attempt to direct learning outside the recitation period. His task was first to keep order and then to hear lessons, inflicting appropriate punishments upon all who were unable to respond satisfactorily. As one phase of our educational progress, particularly during the last quarter of century, there has been an increasing insistence upon the teacher's acceptance of responsibility for directing students in the doing of assignments.¹ "Supervised study" is a name given to a variety of procedures and combinations of procedures which have for their purpose the guidance of students in learning activities engaged in outside of the recitation period. The immediate purpose of this guidance is usually to bring about more effective "getting of lessons." An ultimate purpose is the training of the students to be skilful learners.

Names for the direction of learning outside of the recitation period.—Aside from the fact that "supervised

¹This movement has been intimately connected with attempts to provide for individual differences.

study" has no standard meaning, the term has been criticized on the ground that it has misleading connotations. "Study" suggests student activity rather than teacher activity, and the meaning of "supervision" as used in the phrase "school supervision" is not satisfactory. Hence a number of educators have suggested the abandonment of the old term in favor of some new one. Among these proposed substitutes for "supervised study" we find: (1) "supervised learning," suggested by Inglis,¹ (2) "directing study," sponsored by Miller,² and (3) "directed study," used by Burr³ and Morrison.⁴ In the title of this chapter we have used a rather cumbersome phrase, "directing learning outside of the recitation period." The addition of the term "supplementing" indicates that the scope of the chapter exceeds that of one devoted solely to the topic of supervised study.

The problems of this chapter.—In the discussion of the stimulation and direction of learning in Chapters IV to X there was little distinction between the learning activities of the recitation period and those engaged in outside of it, i.e., in the laboratory, shop, library, and study room, and at home. The "recitation period" designates one group of conditions relative to the stimulation and direction of learning. The members of a class are assembled and they tend to be active as a group rather than as individuals.⁵ The teacher is present and usually assumes

¹INGLIS, ALEXANDER.—*Principles of Secondary Education*. Boston: Houghton Mifflin Company, 1918, p. 713.

²MILLER, H. L.—*Directing Study*. New York: Charles Scribner's Sons, 1922, 377 pp.

³BURR, A. W.—"Directed Study," *School Review*, 27:90-100, February, 1919.

⁴The term "directed study" has been employed by Morrison in several places.

⁵This statement does not apply when the instruction is laboratorized. See page 372 f.

the function of a leader. He has the opportunity to observe his students as they engage in learning activities and hence to apply stimulative and directive procedures as they may appear to be needed. Somewhat different conditions prevail in the laboratory and shop and during periods for directed study or on field trips and excursions. The activities of the students are largely individual. The teacher is present but he does not act as a leader and he is somewhat limited in his observation of the activities of his students and in applying directive procedures as they may be needed. Learning is carried on under a distinctly different type of conditions when the student studies at home, or in the library or study hall. The teacher is not present and his stimulation and direction of the activity are necessarily at long range. Since the teacher's responsibility extends to learning activities engaged in outside of the recitation period, it is necessary to consider the technique of "long-range" stimulation and direction of learning as well as that to be employed relative to learning carried on in the presence of the teacher.

Closely allied with this problem is that of supplementing the learning activities carried on outside of the recitation period. In preparing a lesson either at home or at school, or even when working in the laboratory, the student frequently encounters difficulties that he is unable to overcome or fails to continue his learning until all objectives have been attained. When such conditions prevail, it is necessary for the teacher to provide appropriate supplementary exercises.¹ Frequently these will be done during the recitation period as in the case of requests to listen to

¹The determination of what supplementary exercises are needed is based in part upon the principle that the learning activities in which the student engages should constitute a balanced ration. See page 148.

explanations or elaborations of topics. Other types of supplementary exercises may be assigned for home study.

Administrative provisions for directing learning outside of the recitation period.—In considering the direction of learning outside of the recitation period it is important to distinguish between the instructional procedures that the teacher employs and the administrative provisions designed to facilitate this phase of the teacher's task. The direction of learning is most difficult when it takes place at home or in a general study hall. Hence various plans for "supervised study" have been devised whose essential feature has been the provision for study in the presence of a teacher, usually the one who assigns the learning exercises. Brownell¹ has described a number of these plans² as follows:

I. *Special study halls.*—In this plan, the study period is separated from the recitation. The students segregated for study occupy either large assembly halls or special small rooms, holding perhaps thirty pupils (the latter plan known as the "East Cleveland" or "neighborhood room" form of supervised study). Within these rooms the students proceed with study under the direction of either special study teachers or regular teachers who may be assigned study-hall duty as part of their daily programs.

II. *The conference plan.*—The purpose of this plan is to provide direction for individual pupils, usually the backward. There are many variations. The conference may be voluntary or required for all the pupils or for only those

¹BROWNELL, W. A.—"A Study of Supervised Study," Bureau of Educational Research Bulletin No. 26, University of Illinois Bulletin, Vol. 22, No. 41. Urbana: University of Illinois, 1925, pp. 12-16. A few changes in terminology have been made.

²The reader should note the overlapping of supervised study and provisions for individual differences. See page 392 f.

who are behind in their work; it may be held at stated times or by appointment; the time may be during regular school hours or after school; special teachers may be assigned to this particular task, or the regular teachers may do it.

III. *The De Kalb Plan*.—The school program under this plan provides one period a week for the supervision of study, all the other periods being for the usual purposes of recitation and undirected study.

IV. *The Pueblo Plan*.—This technique goes to the opposite extreme from the De Kalb Plan just described. Under the Pueblo Plan, which was devised by Superintendent Preston Search, all recitations are abolished, and the whole school day is devoted to study under the direction of teachers. This represents a return to individual instruction par excellence.

V. *Daily extra period*.—This plan which, according to Willett,¹ was used at Des Moines, Iowa, as early as 1906, and later at Pottstown, Pennsylvania, provides, as its name implies, an extra period each day for the preparation of work under supervision. All pupils with a standing of 90 per cent or better, however, are excused from this extra period and are dismissed at the end of the regular school day.

A variation of this plan called the "study class," in which each department regularly supplies a teacher for coaching the backward pupils in an extra period, is reported by Harris.² Another adaptation is described by Nielson³ under the name "deficiency period."

¹WILLETT, G. W.—"Supervised Study in High School," *School Review*, 26:259-72, April, 1918.

²HARRIS, G. L.—"Supervised Study in the University of Chicago High School," *School Review*, 26:490-510, September, 1918.

³NIELSON, C. H.—"An Innovation in Supervised Study," *School Review*, 25: 220, March, 1917. (Editorial comment.)

VI. *Differential plan*.—In this plan of supervised study the teacher is given large discretionary powers. There are no specific requirements regarding the amount or the nature of the pupil-direction to be given. Such matters are left entirely to the judgment of the teachers, the understanding being, however, that a certain amount of guidance shall be given. One feature of the plan as described by Burr,¹ though not under this name, is the practice of furnishing pupils with printed cards of directions on study.

VII. *The double period*.—The essential idea here is that two regular periods are assigned to each of the high-school subjects, in one of which the pupils recite and in the other of which they study. The common practice seems to be to assign two teachers to each subject, one being in charge continuously of study; the other, of recitation. This results in a definite break being made between these two phases of the pupil's activity.

Some authorities assign the credit for initiating the procedure to Superintendent J. Stanley Brown, of Joliet, Illinois. A description of the plan under the name "the laboratory-recitation plan" is given us by Superintendent I. M. Allen² of Springfield, Illinois. The plan worked out by Superintendent Kennedy at Batavia, New York, and hence known as the "Batavia Plan," appears to have been of this general type.³

VIII. *The divided period*.—This plan, in one or another of its many forms, is probably the most widely used. It differs from the double-period plan in that: first, customarily but one teacher is in charge of the group for both study

¹BURR, A. W.—"Directed Study," *School Review*, 27:90-100, February, 1919

²ALLEN, I. M.—"An Experiment in Supervised Study," *School Review*, 25: 398-411, June, 1917.

³See page 393.

and recitation in the same school subject; and, second, the class activity is maintained as a unit, without a break between recitation and study. Usually it involves the lengthening of the class period and hence is sometimes described as the "lengthened-period" plan.

There is the widest variation in this plan from the standpoint of length of period and distribution of time within the period. On the first point, we have periods running from fifty minutes to over one hundred, with the commonest practice probably at about sixty minutes. On the second, utilization of time, we have the full course of possibility from the one extreme where the teacher employs the class time as she wishes, to the other extreme, where the period is definitely laid out into a number of sub-periods, each of which is intended for a certain type of activity. As an instance of this latter, we have the following:¹ "recapitulation, five minutes; statement of the business of the day, two minutes; discussion, twenty-five minutes; assignment, five minutes; study period, twenty-five minutes." Probably the commonest procedure is to divide the lengthened period roughly into halves, the first being used for recitation, and the second for study.

What is sometimes called the "Merriam Plan" and at other times the "Columbia Plan"² belongs to this general type, its chief distinction being the prominence given the assignment. One third of the period is taken up by the teacher for this purpose.

IX. *The Seattle Plan*,³ or the supervised-home-study

¹YOUNG, EULA, and SIMPSON, M. R.—"A Technique for the Lengthened Period," *School Review*, 30:199-204, March, 1922.

²MERRIAM, EUGENE E.—"Technique of Supervised Study," *School Review*, 26:35-38, January, 1918.

³COLE, THOMAS R.—"One Year of Supervised Study," *School Review*, 25: 331-35, May, 1917.

plan.—While somewhat like the divided-period plan, the Seattle Plan differs in its attitude toward home study. Steps are taken to direct the study at home by means of definite instruction in procedure, specific tasks to be accomplished, and the like.

X. *The University High-School Plan, of the University of Chicago*.—Here, practically the whole period is devoted to study under the direction of the teacher. In this respect it resembles the Pueblo Plan. The work in the University High School is laid out into what are called “units,” which vary in length, usually from two to five weeks, with the particular subject and the type of topic.¹ At the conclusion of the period devoted to any one unit, the amount of time depending upon the ability of the pupil, opportunity for a form of recitation is given, when “floor talks,” papers, and so forth may be presented.

The Wisconsin High School, of the University of Wisconsin, follows a similar procedure: the “units” are called “challenges,” and there is specific effort to secure motivation through the grading system.²

XI. *The graduated plan*.—This plan devised by Superintendent Paul Stetson,³ at Grand Rapids, Michigan, differs from all others in its recognition of the varying needs of pupils in successive grades for direction and help in study. Thus in the seventh grade, thirty minutes are given to recitation and thirty to study; in the eighth grade, the ratio of time for recitation to study is 35:25; in the

¹For a description of this phase of the plan see: MORRISON, H. C.—*The Practice of Teaching in the Secondary School, Chicago*: University of Chicago Press, 1926, pp. 574-607.

²See page 373 f. For a more extended description see: MILLER, H. L.—*Directing Study*. New York: Charles Scribner's Sons, 1922, Chapters I and II.

³STETSON, PAUL C.—“A Survey of Supervised Study,” *The American School Board Journal*, 54:19-20, 85-86, June, 1917.

ninth grade, 40:20; and in the last three years, or the senior high school, 45:15. Beginning with the ninth grade, provision is made for a "consultation period" of thirty minutes a day to take care of the backward.

XII. *Study coach*.—Hall-Quest¹ lists as a form of supervised study the practice of providing one or more special teachers whose sole task is to train pupils in study methods.

XIII. *Review groups*.—In the same reference, Hall-Quest describes as supervised study the segregating of backward children into special groups for instruction. The idea here is probably the same as that mentioned by Hines² under the name "delayed-group plan."

XIV. *Printed directions*.—Hines, in the article cited, also regards as a form of supervised study the practice of supplying to pupils directions for study, such as the study programs recommended by Reavis.³ Such a procedure, if it stops at this point, is certainly a far cry from the elaborate plans for the immediate direction of study called for in other schemes which we have briefly reviewed.

Examination of the descriptions of these plans of supervised study reveals that practically nothing is said about the instructional procedures that the teacher should employ in directing the learning of students. The voluminous literature on supervised study deals mainly with administrative provisions designed to facilitate the stimulation and direction of learning. The writers appear to have assumed that if a period was provided, teachers would be

¹HALL-QUEST, ALFRED L.—"The Direction of Study as the Chief Aim of the High School," Chapter X, *The Modern High School*, edited by Charles H. Johnston. New York: Charles Scribner's Sons, 1916, p. 278.

²HINES, H. C.—"Supervised Study in the Junior High School," *School and Society*, 6:520, November 3, 1917.

³REAVIS, W. C.—"The Importance of Study Programs for High-School Pupils," *School Review*, 19:398-405, June, 1911.

able to "supervise" study. This chapter is written from a different point of view. We shall not assume any particular administrative plan. As stated on page 407 we shall be concerned with the instructional procedures that the teacher should employ in directing learning outside of the recitation period.

A classification of directive techniques.—When considered relative to the direction of learning outside of the recitation period, the procedures of the recitation period may be grouped under four heads: I. Assigning learning exercises; II. Laying down rules and offering suggestions for doing the exercises assigned; III. Engendering study habits; IV. Diagnosing study procedures and achievements.

I. *The assignment as a means of directing learning.*—When inquiring into the cause for the failure of students to do the exercises assigned, many teachers have found that frequently the students had only a very hazy idea of what they should do.¹ Undoubtedly this condition was due in part to the failure of the students to give attention to the assignments made by the teacher, but examination of assignments has revealed that many of them were faulty. Some of them were indefinite; others were stated only in terms of "ground to be covered."

In making assignments the teacher should distinguish between the objectives to be attained, i.e., what the student is to learn, and the exercises he is to do in attaining these objectives. As we have pointed out in preceding chapters² it is usually desirable that the student have a clear under-

¹An illuminating discussion of this point is given by: BRESLICH, E. R.—"Supervised Study as a Means of Providing Supplementary Individual Instruction," *Thirteenth Yearbook of the National Society for the Study of Education*, Part I. Chicago: University of Chicago Press, 1914, pp. 42-48.

²See pages 102 f, 127, and 193 f.

standing of the immediate objectives to be attained, but a clear understanding of objectives is seldom sufficient for efficient learning. In the high school clearly formulated exercises should usually be assigned. However, this principle does not specify how detailed the exercises should be. For example, in such subjects as history or geography the teacher may ask comprehensive questions or he may ask very detailed questions.

In a recent investigation¹ of directing the study of a textbook, the investigator prepared detailed exercises, similar to those employed in silent reading tests,² on the pages of the text to be read. On the basis of the data obtained the conclusion was reached that, "if we define study as 'the work that is necessary in the assimilation of ideas' and accept the true-false test as one method of testing this assimilation, then it must follow that the objectively scorable study questions did improve the methods of study of the children."³ In one group of fifty sixth-grade pupils, forty-eight expressed a preference for study exercises of the type used. Among the reasons given were: "The questions could all be answered from the text"; "The things you needed to know were found more easily"; "After answering the questions it was easier to remember them."

¹REEDER, E. H.—"A Method of Directing Children's Study of Geography," Teachers College, Columbia University, Contributions to Education, No. 193. New York: Bureau of Publications, 1925, 98 pp. See also HILLIS, C. C., and SHANNON, J. R.—"Directed Study: Material and Means," *School Review*, 34: 668-78, November, 1926.

²Various types of exercises were used, multiple-choice or best answer, true-false, completion and the like. See page 514^f for a description of these exercises. The Haggerty Reading Examination, Sigma 3, and the Thorndike-McCall Reading Scale furnish illustrations of the exercises. When used as a means of directing study such exercises have been called "objectified assignments." See Exercise 13 at the end of this chapter.

³*Loc. cit.*, p. 45.

It is probably true that if the objective to be attained is the remembering of certain facts, the learning activities of students can be made more efficient by assigning detailed exercises which require these facts as responses. However, it is doubtful if such assignments will contribute much to the engendering of initiative, resourcefulness, good study habits, and the capacity to deal with large thought questions.¹ Detailed study questions may be helpful when a class is beginning the study of a subject, especially in the junior high school or in the case of students who are lacking in ability to read a textbook, but the teacher should endeavor to train his students so that such study helps will not be needed. On the other hand, the assignment should always include some definite exercises to be done. Apparent exceptions to this principle may be justified after the students have become familiar with the assignments in a subject and consequently are able to formulate exercises for themselves.²

The teacher should not use the assignment to make the work easy. The student learns only as a result of his own mental and physical activities, and if the teacher gives too much assistance he deprives the student of opportunities to learn. On the other hand, the exercises set for the student to do should not be too difficult. He should not be asked to work under handicaps that make success unlikely. Frequently the teacher should stimulate students to recall things they have previously studied, or experiences outside of school. Sometimes it may be necessary for the

¹See the discussion of teachers' objectives, page 75 f.

²When the project method is employed, the students are made responsible for formulating most and sometimes all of the learning exercises. According to the problem method the teacher assigns a large exercise, called a problem, and the detailed exercises grow out of the difficulties that the students encounter. See Chapter XIV for a discussion of the project method.

teacher to supply needed information that students will not be able to find easily. When the assignment involves new types of learning exercises the teacher should indicate how they are to be attacked.

An assignment need not be confined to a single day's work. Frequently an assignment may set a task for several days; in some cases for two or three weeks. When working on such an exercise or group of exercises little time need be given to the assignment made after the class is well started upon the study of a topic.

Some teachers use an outline as a means of making assignments, especially when they are attempting to employ the topical method. The following outline for the "Beginnings of the English Reformation" is typical. A list of references is usually added.

1. The movement on the Continent.
2. The Reformation under Henry VIII; causes; divorce; legislation of the Parliament; break with Rome; the royal supremacy; dissolution of the monasteries; translation of the Bible; doctrinal changes; the Ten Articles; attitude of the nation; the Pilgrimage of Grace; fall of Thomas Cromwell; the Six Articles; condition at the close of the reign.
3. The Protestant Revolution; Edward VI and his advisers; policy of the government; measures; attitude of Nation.
4. The Catholic reaction; Mary's aims; attitude of Parliament and of the nation; the Spanish Marriage; reunion with Rome; the persecutions of Mary; results of Mary's policy.

Such an outline, which may be mimeographed and distributed to the class, is nothing more than a systematic enumeration of topics about which something is to be learned. It is not a list of learning exercises and therefore does not constitute a good assignment. At best it is only an indefinite statement of certain immediate objectives.

In addition to the character of the assignment the time

when it should be made is frequently important.¹ The most common practice is to make the assignment just before the close of the class period. Very frequently the result is that too little time is available in which to make it satisfactorily. There are, however, several arguments advanced to justify the practice. Probably the most valid of these is that the next day's work should be a logical outgrowth and continuation of the present day's and that, therefore, the assignment should grow out of the current day's work. Another argument is that the assignment should be made as near to the study period as possible so that the opportunity for the students to forget it before they begin their study will be minimized.

Both of these arguments have a measure of validity, but it does not follow that assignments regularly should be made just before the end of the period. If the recitation is followed by a supervised study period during which the students remain with the same teacher, the close of the class period is generally the best time at which to make the assignment. In such a case the teacher will not be hurried, since, with the study period just ahead, as much time as is necessary can be used. In fact, the assignment is so closely connected with the study which is to follow that it may be considered a part thereof and thus as belonging at the beginning of the study rather than at the close of the recitation period.

When a supervised study period does not immediately follow the recitation, or when the assignment does not depend upon the current day's work, it should be made at

¹This discussion of when to make the assignment is taken with a few minor changes from ODELL, C. W.—"The Assignment of Lessons," Bureau of Educational Research Bulletin No. 38. University of Illinois Bulletin, Vol. 23, No. 7. Urbana: University of Illinois, 1925, pp. 4-6.

the beginning of the period. The one outstanding advantage of this is that sufficient time is assured. In addition, it is probable that a higher degree of interest and attention can be secured at this time than later in the period. In case the assignment does depend upon the current day's work, it is ordinarily necessary to wait until the close of the recitation to make it. Occasionally, however, something arises in the course of the class discussion that furnishes a very good point of departure for assigning part or all of the exercises which the teacher wishes done for the next day. Some student may raise a question that cannot be answered offhand and which appears worthy of further consideration; the teacher may discover that some item needs further study; or some other occasion may arise which will motivate a portion or all of the assignment and which can be taken advantage of most profitably by making the assignment at once. For example, in American history the class may be discussing the part taken by Roosevelt in the war with Spain, and some student may raise a question as to Roosevelt's later career. This would be a suitable opportunity to make an assignment dealing with Roosevelt's administration. To give another example: the teacher of a second-year Latin class might seize the moment when the students discover the difficulty of translating the speeches of Cæsar and Ariovistus to make an assignment dealing with indirect discourse. This suggestion of course holds true whether a supervised study period follows or not.

It should be apparent from the preceding discussion that no fixed time can be specified for making the assignment. An additional reason is that the number of minutes required will vary. Sometimes an entire period may be devoted to making an assignment; at other times, especially

when it grows out of the recitation, it may be made in a very short time. Perhaps the most important principle concerning the time when the assignment should be made is that the teacher's practice be sufficiently flexible that he can adapt it to the differing conditions which arise from day to day.

II. *Rules and suggestions for doing learning exercises.*¹—Before giving suggestive lists of rules for doing learning exercises, the study procedures employed by certain good students will be described. These descriptions indicate that the study of good students tends to conform to certain general patterns rather than to be a random affair. In an investigation² of the study habits, a student who was noted for his exceptional achievements in ancient history stated that he was accustomed to read the entire assignment over in order to get the general trend of thought. He then read it carefully a second time to get the meaning in greater detail. The next step was reading the paragraphs and sectional headings, thinking over the material they represented as a means of testing his familiarity with it. In case he did not remember the discussion which applied to any heading he reread the paragraph again carefully. Just before the class period he was accustomed to review by reading the headings and thinking over what was contained in each paragraph. If he was doubtful about any of the content he studied it again. In the careful reading of the text he looked up words which were totally unfamiliar,

¹Rules and suggestions for doing certain types of learning exercises have been discussed in several of the preceding chapters. See especially pages 139 f, 226 f, and 262 f.

²These descriptions of study procedures are taken from: MONROE, WALTER S., and MOHLMAN, DORA KEEN.—“Training in the Technique of Study,” Bureau of Educational Research Bulletin No. 20. University of Illinois Bulletin Vol. 22, No. 2. Urbana: University of Illinois, 1924, 66 pp.

located on the map places mentioned in the text, and memorized important dates, names, and events. He stated that he is accustomed to criticize the author's statements, occasionally notices where the author has contradicted himself, and brings up such points for discussion in class. He is not accustomed to do any outlining except as it is assigned by the teacher.

Another student who constantly maintained a high standing in algebra stated that his first step in studying a lesson was to study the sample exercises and explanations given in the text. He usually did this even though the teacher's explanation of new types of exercises was clearly understood. In dealing with new types of exercises he compares them with similar exercises in arithmetic. If he makes an error which he has difficulty in locating, he leaves his work for a time and then begins the exercise on a clean sheet of paper. He does not commit to memory formulas and rules verbatim, but tries to remember them as they are applied to some sample exercise.

An unusually capable student in English composition stated that in writing a theme she selects her own topic, which is usually from a list jotted down from time to time. She corrects and rewrites the theme several times, reads it both silently and aloud, and then lays it aside until the next morning when she goes over it again before the final copying. She does this because after a lapse of time she is frequently able to discover errors and imperfections which she had failed to notice. She uses a dictionary for correcting spelling and for finding synonyms and new words, and, unless the teacher has requested her not to do so, she consults reference books regarding punctuation and other doubtful points.

The following list of general rules for study has been

carefully prepared after examining much of what has been written on this topic.¹

1. Successful study is difficult in a room which is not warm, well lighted, well ventilated, and otherwise physically comfortable. Successful study is also difficult in a room where there are other persons, or where there are disturbing noises or objects. Thus, the first step to be taken is to provide a physical environment which will not interfere with effective study.
2. Make out a daily schedule in which you assign a regular time and place for the study of each subject.
3. Plan to study an assignment as soon as possible after it is made; then review the lesson briefly just before going to class. Do not wait to study a lesson until just before class, because you will have difficulty later in remembering what you study.
4. Before you start studying a lesson collect all of the texts, reference books, and other material which you will need so that your work will not be interrupted.
5. Begin working as soon as you sit down, with the determination that you will keep your mind on your lesson, that you will study for all you are worth, and that you will complete your task as quickly as possible. Do not waste any time getting started.
6. Begin your studying by recalling the main points of the previous lesson, and then get clearly in mind the assignment which you are to study.
7. At the end of your study of a lesson, summarize briefly what you have learned. In this summary the most important points should be clearly stated. Usually this summary should be written.

¹The literature is rather voluminous. For a summary of research see: SYMONDS, PERCIVAL.—“Methods of Investigation of Study Habits,” *School and Society*, 24:145-52, July 31, 1926. LYMAN in *The Mind at Work* has made available in convenient form some of the best discussions on the topic. He also gives a very carefully selected bibliography. A very excellent summary of rules and suggestions relating to study is given by KORNHAUSER, ARTHUR W.—*How to Study*. Chicago: University of Chicago Press, 1924, 42 pp.

8. Watch carefully for items which you are unable to understand and check them for the purpose of asking your teacher for an explanation. Plan to ask your teacher at least one good question on each lesson.
9. Keep studying until you are certain you have your lesson or know just what your difficulty is.

Supplementary directions for the study of a particular school subject.—The nature of the learning exercises in the different school subjects makes it necessary to supplement these general directions by others specifically adapted to the nature of the work in a specific subject. The consideration of such supplementary directions more properly belongs in the several courses in special methods, but it will serve to round out the topic here if a couple of illustrations are given. History and algebra have been chosen for this purpose.

*History.*¹

1. Before beginning the reading of the lesson in history be certain that you understand the assignment. It should give you a definite purpose for your reading, that is, you should understand what information you are to find and what use you are to make of it.
2. First, read over the entire assignment rapidly to get the general trend of thought and the main ideas. Give attention to the paragraph headings and the marginal summaries.
3. Next, read over your lesson a paragraph at a time. Read it carefully. Look up the meanings of unfamiliar words. Locate on the map places mentioned. Read paragraphs and sections to which cross references are made.
4. Underline the important sentences. However, you should be certain that the sentence is important before you underline it.
5. As you study, keep the aim of your assignment constantly before you.

¹See also the rules relating to reading, page 26 f.

6. Try to determine the reason for the statements the author makes.
7. Study each paragraph until you are able to give the main points without looking at your book. Commit to memory important names, dates, and definitions.
8. When you have finished an assignment, review it in your mind and summarize it by recalling the most important points. If your lesson consists of several divisions, do this for each division.
9. Spend at least as much time in thinking about your lesson as in reading about it.
10. Formulate a series of questions which to answer will require an understanding of the most important ideas in your lesson.
11. Try to answer the following questions:
 - a. What is the relation of to-day's lesson to the general topic you are studying and what does it contribute to this topic?
 - b. What is the relation of the general topic to the field of history you are studying?
12. When you have finished the study of a major topic, which will usually be represented by a chapter in your text, prepare an outline that will show the important questions you have studied and the principal points in their answers.

Algebra.

1. As a preparatory step, get the assignment clearly in mind, recall the teacher's explanation, and study again the sample exercises and the explanations given in your textbook.
2. Read your exercises carefully. Be certain that you understand what is given and what is to be done, and that you keep these facts clearly in mind while working. Make sure that you copy the exercise correctly on your paper.
3. Take plenty of time to think. Do not begin work until you understand exactly what is given and what is to be done.
4. If you do not know how to begin in doing an exercise, consult your textbook and try to recall explanations that your teacher has given.

5. When an exercise is made up of a series of steps, do one step at a time.
6. Compare exercises in algebra with the same types of exercises in arithmetic. Frequently this will give you a suggestion.
7. Work carefully. It is easier to avoid mistakes than to find them after they are made.
8. When you are unable to work an exercise do not give up; at least try to find out just what your difficulty is.
9. When it is possible to do so, check the answer that you obtain.
10. Memorize important rules and formulas, but be certain that you understand them.
11. Use rules and formulas as soon as possible after you have learned them in order that you may fix them in your mind.

III. *Teaching study habits.*¹—The procedures followed by good students frequently illustrate good study habits.² A typical undesirable study habit in dealing with written problems in algebra is illustrated by the student who begins to manipulate the numbers of the problem in a somewhat random way hoping that he will be fortunate enough to secure the right answer, or one that appears to be satisfactory. Another undesirable learning habit frequently occurs in answering questions. Many students accept the first answer which occurs to them without inquiring into its accuracy or completeness.

As we pointed out in Chapter III, training students to be efficient doers of learning exercises is one of the impor-

¹In the term "study habits" or "habit of study" the word "habit" has a meaning very different from that given to it in Chapter V. There it designated a specific control of conduct which functioned in response to a certain stimulus. A "habit of study" is a general pattern of conduct. It defines a general procedure which expressed in words is usually called a rule or principle. See Chapter X.

²See page 420f for descriptions of study procedures employed by certain good students.

tant objectives of the high school. The student who has discovered how to proceed in attacking a problem in algebra or in reading an assignment in history has acquired a valuable control of conduct, perhaps more valuable than the knowledge of mathematics or of history which he gains. Students are constantly having experiences in the doing of learning exercises, and the teacher should stimulate and direct them in developing from these experiences general patterns of conduct which will be useful as guides in future learning.

Teachers usually focus their attention upon the results of learning, particularly upon the skills and knowledge, and as a result procedures of learning are treated incidentally by both students and teacher. The students are satisfied when they are able to demonstrate the skills and knowledge required by the teacher. In the case of written work neither they nor the teacher appear to be much concerned about how they were able to produce the performance. Most students fail to acquire habits of learning which will make them proficient learners in future work. The remedy for this deplorable condition is more direct teaching of habits of learning. It will not be sufficient merely to give the class a list of general rules for study, although this will help. The problem must be attacked in a more direct way. The teacher should diagnose the study habits of his students and make each one aware of his deficiencies. He should then proceed to engender desirable study habits and keep this objective before the class.¹

Frequently it will be helpful for the teacher to ask his

¹An illuminating description of instructional procedures that were effective in engendering certain study habits is given by HELSETH, INGA OLLA.—*Children's Thinking*, Teachers College, Columbia University, Contributions to Education, No. 209. New York: Bureau of Publications, 1926, 163 pp. See especially pp. 81-110.

students concerning the general procedure they follow in studying the assignments. The list given below is not intended to be complete, but rather suggestive of those which may appropriately be asked.¹

1. About how much time do you spend in the study of your lesson?
2. When you study at home what sort of place do you have for your work? Are there other people in the room? Are you subjected to other distracting influences?
3. Do you have a regular time for studying each lesson?
4. Do you try to complete one lesson before taking up another?
5. Do you find your mind wandering from your lesson, or is it rather easy for you to concentrate your attention upon the assignment?
6. Do you often stop to do other things?
7. In case you have some lessons that are easier than others, which one do you usually do first?
8. In the study of a lesson do you attempt to pick out the most important points or topics and study them most?
9. When you learn a new rule or principle do you endeavor to use it or to find illustrations of it?
10. Do you have difficulty in recalling the assignment the teacher made? Do you ever find that you have misunderstood assignments?
11. Do you ordinarily keep on studying a lesson until you feel certain that you have done it satisfactorily, or are you inclined to stop before you have finished when you have encountered a difficulty you cannot immediately overcome?
12. Have you ever thought about your plan of study? Do you know whether you are following a good method?
13. Do you believe you could improve your study procedure if you gave attention to the matter?
14. Do you know how other students study?

¹See page 331.

When an assignment is made that involves a new learning exercise or one that the teacher judges may be difficult, he may propose the question, "What will be a good procedure to follow in studying this assignment?" From the procedures proposed by the members of the class, and possibly from additional ones suggested by the teacher, the students should be directed so that they will develop efficient rules and principles relating to the procedure of study.

In giving a student the right start in acquiring a study habit, such as the underlining of important words and phrases, taking notes, etc., detailed guidance by the teacher will frequently be required. The teacher may illustrate to the class how he would underline, take notes, etc., or he may call upon some of the more efficient students to describe their procedures. An alternative plan would be to take a passage in the text and ask the class to read it and pick out the phrases and sentences which they think should be underlined. After each student has had time to read the passage through, someone should be called upon, and then his reply should be criticized and supplemented by the other students. In teaching a foreign language the teacher may appropriately use several class periods to illustrate how he would go about translating the text to be read.

Steps in teaching a study habit.—Carter¹ has suggested the following steps for the teaching of a study habit:

1. Find to what extent and how well the class as a whole uses the habit.
2. Bring the particular habit to the pupil's attention.
3. Get those who do not use the habit to realize that they do not.

¹CARTER, RALPH E.—"Teaching a Study Habit." *School Review*, 29:700, November, 1921.

4. Tell them the advantages of using it, illustrate it, and as far as possible demonstrate its value.
5. Give specific emphasis and drill on it in the regular daily work.
6. Provide means by which the pupil may note his own improvement in the habit.

IV. *Diagnosing learning carried on outside of the recitation period.*—In diagnosing learning carried on outside of the recitation period, the teacher should have a dual purpose. He should endeavor to ascertain faults of study procedure as well as errors in achievement. In the case of laboratory work in physics, chemistry, and other sciences, shop work, or laboratorized instruction in other subjects, diagnostic information can be secured by observing the students as they work. The teacher, however, must be a trained observer. He must know what things are significant symptoms of faulty procedure and achievement. Mental activity is not observable and in many cases the observable performance will not reveal the faults in a student's learning activity. When this condition exists it becomes necessary for the teacher to ask questions or employ other means of diagnosing the student's work. So far as possible the teacher should plan diagnostic questions in advance rather than depend upon the inspiration of the moment as he observes the work of a student.

When the learning activity is not carried on in the presence of the teacher, the recitation period affords an opportunity for diagnosis.¹ The responses of students to the

¹A number of educational theorists and even some teachers have advocated the abolition of the recitation period maintaining that "lesson hearing" has very little or no educative value. It is probably true that many teachers fail to utilize the recitation period very efficiently, but this fact is not sufficient to justify its abolition. In addition to providing an opportunity for diagnosis, the recitation may be used for explanation, illustration, elaboration, and certain other types of supplementary instruction.

questions asked by the teacher are evidence of their achievements and indirectly of their study habits. Since words and phrases are only symbols of knowledge, the teacher must be skilful in interpreting oral performances of students.¹ Frequently diagnostic information may be secured by giving the students an opportunity to report their difficulties. When the assignment has included new types of exercises or ones involving difficulties, a few students may be asked to describe their procedure in doing them. Since such a request is likely to be new to most students, the teacher may need to ask detailed questions in order to secure the significant information. After the meaning of the request has been made clear to the students, they may be asked to describe their methods in writing. These reports should be studied carefully by the teacher, and should be used as a basis for his efforts in attempting to engender good learning habits.

Indirect evidence concerning learning habits may be secured from an analysis of student performances. When daily written work is required a competent teacher will be able to learn much concerning the methods of study the students employ. Many errors of procedure will be reflected in the performances. Test papers also offer an opportunity for the diagnosing of learning habits. Some of the standardized silent reading tests have been found useful for this purpose.²

Economy of time in handling written work.—The evaluation of written work is widely employed as a procedure for directing learning activities outside of the recitation

¹See page 155 f.

²THORNDIKE, E. L.—“Reading as Reasoning: A Study of Mistakes in Paragraph Reading.” *Journal of Educational Psychology*, 8:323-32, June, 1917, and “The Understanding of Sentences: A Study of Errors in Reading.” *Elementary School Journal*, 18:98-114, October, 1917.

period. It is a time-consuming task and doubtless many teachers devote entirely too much time to it. In some cases they appear to carry on correspondence courses with the members of their classes and as a result they do not have sufficient time for making adequate preparation for the classroom instruction, or for their own professional improvement. It is, therefore, highly important that the teacher should not allow the handling of written work to consume too much time. This, however, does not mean that written work should not be required. Many teachers have devised schemes of marking papers which result in a great economy of time. Others make it a practice not to examine, at least more than casually, all written work. They inspect only samples. It is seldom justifiable to throw written work in the waste basket without examination. It deserves the teacher's respect. On the other hand, it is not necessary that it be marked in detail. Some teachers have some of the written work examined by students. A common practice is to have students exchange papers. Sometimes the correcting of papers is treated as an honor, and is awarded to students who have attained satisfactory standards in their work. The marking of papers by students has certain limitations, which should not be overlooked; but it may be pointed out that when properly done it affords a student a type of opportunity to learn which he will not encounter in other aspects of his work. It, therefore, is profitable for the student who does it.

In the case of assignments calling for extended reports, such as book reviews, topical reports in history, and the like, the teacher may examine the written work for the purpose of ascertaining some of the more significant faults and then utilize the next recitation period to discuss them, perhaps reading excerpts from the papers to illustrate the

more common faults. In doing this the teacher should avoid mere fault-finding. His criticism should be constructive, but this does not mean that he should furnish the needed corrections or specify in detail how they are to be made. The students should recognize that they are responsible for corrections. If the teacher makes them he deprives his students of an opportunity to learn. Much of the potential value of written assignments is not realized because the students are not required to revise their papers and to correct the errors that have been indicated. The revision of a written report is often a more valuable learning exercise than the preparation of a report on a new assignment.

Supplementary and corrective instruction.—The study of a textbook or the doing of other types of learning exercises outside of the recitation period frequently needs to be supplemented by reciting,¹ giving explanations to the other members of the class, listening to explanations given by the teacher or by a classmate, and the like. The educative value of listening to an explanation or demonstration depends largely upon what is said and the visual aids employed. An explanation explains only when the words and phrases used are fully understood by the listener. As we pointed out in Chapter VI² acquisition of the symbols of knowledge (words and phrases) does not prove that one

¹The reader should bear in mind that "prolonging, repeating, and intensifying one's experiences" is a learning activity. See page 36. The need for the types of supplementary instruction included under the general title of "reciting" is another reason for retaining recitation periods. See page 148.

²Unless the reader is able to recall the discussion of Chapter VI, which deals with the acquisition of knowledge through experiencing and development, he should read it in connection with this consideration of supplementary instruction. The topic of visual instruction is treated somewhat elaborately by DOUGLASS, H. R.—*Modern Methods in High-School Teaching*. Boston: Houghton Mifflin Company, 1926, Chapters VI and VII. A summary of a number of in-

has acquired the ideas, facts, and principles for which they stand. Furthermore, the basic source of ideas is perceptual experience. Hence the teacher should frequently employ models, diagrams, pictures, charts, motion pictures, and the like to supplement oral explanations and expositions.

Anticipatory supplementation.—The word “supplementation” suggests an instructional procedure that comes after the efforts of the students to learn outside of the recitation period, but learning activities of the recitation period may serve as anticipatory supplementation. A review of previous work in connection with an assignment, or an explanation of new words and phrases fulfills an anticipatory function.

Reviews as a type of supplementation.—Learning carried on outside of the recitation period as well as that occurring during it is usually supplemented by what are commonly called “reviews.” It is characteristic of the human mind to forget. Motor skills and memorized symbols, facts, and statements tend to be forgotten. Furthermore, learning is a process of growth and must be continued over a considerable period of time before mastery is attained. Hence it is necessary that students engage in learning activities designed to supplement those engaged in during the first study of a topic. Reviewing is not another type of learning coördinate with those described in Chapter II but rather a phase of these types of learning, particularly those resulting in the acquisition of specific habits and knowledge.

Two functions of reviewing.—Although there is no definite line of demarcation, two functions of reviews may be

vestigations relating to the value of visual instruction has been reported by FREEMAN, F. N.—*Visual Education*. Chicago: University of Chicago Press, 1924, 391 pp.

recognized: first, to revive controls of conduct previously acquired but partially forgotten; and second, to mature and supplement the learning accomplished in the original study of a topic or group of topics. The revival function is probably most prominent in the reviewing usually carried on in high schools. When a review lesson is assigned, students repeat some of the learning activities they have done previously but frequently in a somewhat superficial fashion. Their purpose does not extend beyond reviving certain controls of conduct which resulted from their previous study.

A review, however, offers opportunity for more than this. After the controls of conduct previously acquired have been revived the learning may be advanced to some higher level. In the case of specific habits this will mean the attainment of higher standards of perfection. In the case of knowledge it will mean enrichment of meaning and organization of the ideas, facts, and principles.

Relation of reviews to diagnosis.—The attention of the reader has been called to the principle that after the initial stages of instruction the teacher should be guided in his efforts to stimulate and direct the learning activities of his students by definite information in regard to their needs for additional instruction. (See page 143.) This principle is particularly applicable to reviews. The exercises assigned should not be selected at random. They should be chosen for definite purposes and among these the correction of defects in the achievements of various members of the class should be prominent. Hence, it will frequently be advisable for a teacher to make a comprehensive diagnosis of the achievements of his students before review exercises are assigned. It is the custom to have the reviews precede examinations. An examination preceding a review would

furnish a valuable diagnosis and would tend to motivate the doing of the review exercises. The giving of an examination at this time need not interfere with the giving of another examination after the review has been completed for the purpose of measuring final achievement.

When is a review needed?—Graves describes the method employed in the Jesuit schools as follows: "Each day began with a review of the preceding day's work and closed with a review of the work just accomplished. Each week ended with a repetition of what they had covered in that time. The last month of the year reviewed the course of the year."¹ About 1900 we began to have arithmetic texts which embodied a somewhat similar plan for reviews. The examples and problems were arranged so that the student encountered certain types at regular intervals. This spiral plan of textbook organization has been employed to a less degree in other subjects. In stenography, the beginning of a foreign language, algebra, and possibly certain phases of other subjects a rather definite schedule for reviewing will be helpful, but in most high-school subjects the time for review should be determined in part by the topical organization of the subject-matter studied. The logical time for a review in such subjects as history, physics, chemistry, and English literature is immediately after the completion of a major division of the course. The situation, however, is complicated by the fact that in most high schools final examinations are given at fixed times and there is considerable pressure to confine formal reviews to periods immediately preceding these examinations. Although it may be desirable to have a formal review just preceding an examination period, it is important that a

¹GRAVES, F. P.—*History of Education During the Middle Ages*. New York: The Macmillan Company, 1910, p. 217.

period be provided for other reviews at the times when they are needed.

Motivating reviewing.—It is sometimes difficult for teachers to secure the necessary driving power for effective participation in review exercises. If there is not an impending examination which the student feels it is necessary for him to pass, he is likely to approach the doing of review exercises with an attitude of indifference. This attitude is encouraged if the exercises have been selected from those he has done previously. In case the student did the assigned exercises satisfactorily on a previous occasion, he should not be blamed for feeling that he does not need to review. Furthermore, the attitude of indifference is likely to be augmented by the fact that the amount of ground to be covered during a review frequently makes it impossible to do thorough work.

The teacher should seek to secure the necessary motive for engaging in reviews in the same ways that motive is secured for the original study. (See Chapter IV.) An impending examination should not be exploited as a source of motive. A diagnostic test given just preceding the review will frequently be stimulating. Quality rather than quantity should be emphasized; mastery and thoroughness rather than ground covered.

Types of learning exercises for review.—As in other phases of teaching the success of instructors depends largely upon choosing appropriate learning exercises. Not infrequently a teacher restricts a review assignment to the request, "For to-morrow review pages — to —." At best this constitutes a very indefinite learning exercise. The students have not been given definite things to do. If specific habits (skills or fixed associations) are to be revived or mastered the general character of appropriate learning

exercises is obvious. They should provide for efficient practice. It is not inappropriate to use exercises that have been done previously. In fact, reviewing in this case may be considered a part of the distributed drill.¹ When knowledge is to be the principal outcome there will usually be some need for reviving ideas, facts, meanings, and principles, but the emphasis should be placed upon the maturing and organization of knowledge. If the learning exercises assigned, including the questions asked during the recitation period, are selected from those that have been done previously, the learning will be confined to reviving items of knowledge and memorizing them. The maturing and the organization of knowledge are to be attained by doing learning exercises that are new, at least in part.

The significance of the preceding statement probably is not apparent. Thinking occurs when one is confronted with a new situation or encounters a difficulty. If no difficulty is encountered there is no thinking. Hence, a student will not engage in thinking unless he is assigned exercises for which he does not have a ready-made answer. Unless he has forgotten it, he should have a ready-made answer for an exercise which he has done previously. Hence, it becomes necessary for the teacher to formulate new exercises for a review.²

Because a student has a different background of experience it is possible for him to undertake exercises which were not appropriate during the first study of the subject. In general the thought questions asked on review should call for comparison, evaluation, and organization. The preparation of a summary will frequently afford effective learning activity. The preparation of an inventory of what

¹See distribution of drill, page 132.

²In this connection see discussion on page 253 f.

he has learned will frequently be helpful to a student. Exercises requiring application should be stressed. In many high-school subjects it is desirable to require considerable written work during a review.

The following exercises on the topic, "Feeding of Dairy Cattle," in a course in animal husbandry illustrate some good types of review assignments.

1. Summarize the general facts and principles pertaining to the classification of food nutrients and their use to the animal body which one should know relative to the feeding of any animal.
2. Make up a list of guiding principles relative to the feeding of dairy cows which you consider to be essential to proper feeding.
3. Compare this list of guiding principles with a similar one for beef cattle, hogs, horses.
4. Prepare two or more balanced rations using home-grown feeds for dairy cows of given weight and milk flow.
5. Prepare a three-minute speech on the affirmative or negative side of the question: Resolved, That it is more economical for a corn-belt dairyman with 20 cows to buy ready-mixed commercial concentrates than to purchase home-grown feeds and mix them himself.

Other types of review assignments are illustrated in the following list of exercises for that period in United States history which is frequently referred to as National Expansion and Growth of Sectionalism, or the period from about 1815 to 1860.¹

1. Prepare a summary of the causes that contributed to the rapid settling of the "West" during this period, showing concisely the relation of each cause mentioned to the

¹It is assumed that instruction has been carried on largely by the "recitation" method, and that the exercises proposed here have not been used in connection with the day-by-day assignments.

westward movement, and the relation of the different causes to one another.

2. Contrast the policies in support of nationalism that were pursued between the years 1815 and 1823 with the manifestations of sectionalism during the years from 1824 to 1837.
3. Trace the history of tariff legislation from 1816 to 1845, and explain the change in attitude toward the tariff which had taken place in the South between 1816 and 1832.
4. State and support your opinion as to the wisdom of the following of President Andrew Jackson's acts:
 - (a) His practices in filling appointive offices.
 - (b) His handling of the nullification situation in South Carolina.
 - (c) His removal of government deposits from the National Bank and his veto of the bill to recharter the bank.
5. Compare the North and the South with respect to social and industrial conditions existing during this period (1815-1860).
6. Prepare a summary of the reasons slavery had persisted in the South while it had been abandoned in the North.
7. Why and how did the slavery question become an issue before Congress? Do you think Congress might have so dealt with the slavery question as to have effected a permanent and peaceful settlement of the issues raised? Defend your answer.
8. Prepare a biographical sketch of Clay, Calhoun, or Webster.

Cramming as a type of reviewing.—The term "cramming" has been used to designate a type of reviewing which is sometimes done just prior to a final examination. Usually the term is intended to imply that the learning is confined largely to memorizing knowledge symbols and that the student has neglected the assignments throughout the term. It is obvious that neither of these practices can be defended, but intensive reviewing just prior to an exami-

nation may be desirable. A student learns only as the result of his own activity and hence the one who puts the most energy into a review is the one who will get the most out of it.

Balance of instructional activities.¹—A number of instruction procedures have been noted in the preceding discussion; making assignments, hearing lessons, engendering study habits, diagnosing learning activities, giving directions for doing exercises assigned, employing visual aids, conducting reviews, etc. Each of these procedures has a worthy function. None of them should be abolished; none of them should be overemphasized. A teacher's efficiency is affected by the balance of his instructional activities.

LEARNING EXERCISES FOR THE READER

1. Chapters V-X inclusive deal with the general topic of directing the various types of learning. Devise a series of learning exercises for a review of this group of chapters.

2. For two high-school subjects contrast the learning exercises suitable for a first study of a section of the course with exercises which would be suitable for a review of the course.

3. Why is "cramming" criticized? Are teachers to blame? What remedies would you suggest for cramming?

4. Considering the function of a review, would you advocate the abolition of final examinations in history, English literature, rhetoric, science, and mathematics? Why?

5. What are the advantages and disadvantages of setting apart a fixed period, such as the last three weeks of the term, for a formal review?

6. What is incidental review?

7. Why has the term "supervised study" been criticized?

¹See Chapter XI, p. 375.

What are the advantages of the substitutes that have been proposed? See page 406.

8. Write down a list of study habits that you think you have acquired. Evaluate them.

9. Why should study habits be recognized as important objectives in the high school?

10. Distinguish between "supervised study" and administrative provisions for supervised study.

11. What are the characteristics of good assignments?

12. What are the faults of topical assignments? See page 417.

13. Several types of exercises are given in the following list. It has been proposed that such exercises be formulated by the teacher for pages of the text the students are asked to read. (See page 415.) Leaving out of consideration the labor involved in devising such exercises, estimate the educative value of each type. Refer to the discussion of the teacher's control of reading purposes on page 198 f.

I. Draw a line under the three of the following words which you think best describe the action of the English Colonial soldiers.¹

frightened resolute excited terrified careless
deliberate wavering timid cowardly cool

II. Put a cross (X) before each of the following statements that are discussed in the paragraphs assigned:

- a. The growth of interstate commerce.
- b. National regulation of railroad rates.
- c. The Interstate Commerce Act.

III. Put a check mark in front of each statement which contains an idea that is in the paragraph or that can be derived from it.

1. Previous to the introduction of the factory system manufacturing was done in the homes.
2. Previous to the introduction of the factory system the American homes were scattered rather than in large groups.
3. Jackson was president of the United States at the time the factory system was introduced.

¹The paragraphs on which these exercises are based are omitted.

4. The first kind of power used in American factories was obtained from the rivers.
5. The factory system was introduced into America about 1700.

IV. Answer the following questions in terms of the information given in the assignment:

1. What was the period remarkable for?
2. What was the result?
3. Was drunkenness common during this period?
4. What movement changed the attitude of the people toward drinking?
5. What were the church gatherings in new communities called?
6. What kind of men spoke at these meetings?
7. What disturbed the churches at this time?
8. What effect did this issue have upon the churches?
9. Were the religious gatherings well attended?

V. Answer the following questions:

1. Compare the manners and conduct of the people of the period described in the assignment with the manners and conduct of people to-day.
2. Compare religious organizations of the period described in the assignment with religious organizations to-day. Include in your discussion a consideration of the type of organization, the attitude of the people toward the organizations, and the character of their religious meetings.

VI. Some of the statements given below are *true*, i. e., they agree with the text you have just studied; other statements are *false*, i. e., they do not agree with the text you have just studied. If a statement is true cross out the word "false" in the right-hand margin. If it is false cross out the word "true."

1. This period was remarkable for the amount of drunkenness. True False
2. Prisoners were cruelly treated. True False
3. Men were not put in prison for debt. True False
4. Ministers of the gospel did not drink True False

5. Public opinion came to look upon drinking as an evil. True False
6. There were no religious services in the new settlements. True False
7. The people attended religious gatherings in great numbers. True False
8. One could listen to preachers of great reputation. True False
9. Slavery was not an issue during this period. True False
10. The slavery question affected the churches. True False

VII. Study Stevenson's essay entitled, "On the Enjoyment of Unpleasant Places." You should, of course, try to get the general meaning of the essay, but your particular object at this time is to master the words you will be asked to underline. Study the words carefully in the context. Use a dictionary, if necessary, to determine why Stevenson used just that word in preference to some other word he might have used. After you have completed your study you will be given a test to determine how well you have mastered the underlined words. Underline the following words:

patiently quicken equable boomed placidity
 humours resonant rigid bemaused imminent
 provocative taunt bights amenity precarious
 paradox tawny tranquil desultory breed

VIII. In the following statements taken from the assignment phrases have been substituted for the words which you underlined. On the dotted lines in the right-hand margin write the exact words used by the author.

1. Things looked at for a long time end
 by showing a side that is beautiful.
2. We see places through our own inherent
qualities as through differently colored
glasses.
3. We are of those who arouse in others a
sense of beauty.

4. I put forth the absurd or contradictory statement that any place is good enough to live a life in, while it is only in a few, that we can pass a few hours agreeably.
5. It seemed to vivify and educate my sensibilities.
6. The gaunt telegraph-posts and the hum of the reverberating wires in the keen sea-wind.
7. It seemed to mock and ridicule the country.

14. A possible plan of analyzing instruction during the recitation period is given below. In what phases of teaching, as indicated by this analytical outline, do we find the most serious shortcomings? In answering this question, consider the balance of the several activities as well as the effectiveness of each.

- I. Instructional procedures relating to learning activities carried on outside of the recitation period, i. e., at home or in the study hall or library.
 1. Assigning learning exercises. (In evaluating this procedure consider the character and appropriateness of the exercises as well as the technique employed in assigning them.)
 2. Motivating the doing of the exercises assigned.
 3. Giving advice, suggestions, and direct assistance relating to the assigned exercises.
 4. Evaluating learning activities and achievement.
- II. Instructional activities relative to learning activities carried on during the recitation period under the immediate stimulation and direction of the teacher.
 1. Assigning learning exercises including implied requests to listen to explanations, observe demonstrations and the like.
 2. Motivating the doing of the exercises assigned.
 3. Giving advice, suggestions, and direct assistance.
 4. Evaluating learning activities and achievements.

15. There have been several investigations of the study habits employed by students. Would a high-school teacher find it helpful to make an investigation similar to the ones described in the following reports?

CHARTERS, JESSIE ALLEN.—“Methods of Study Used by College Women,” *Journal of Educational Research*, 10:344-55, December, 1924, and “How Two Hundred and Fifty-Eight Junior College Women Study,” *Journal of Educational Research*, 11:41-48, January, 1925.

CHAPTER XIV

DIRECTING LEARNING ACTIVITIES ORGANIZED AS PROJECTS

In the introductory statements in Chapter I, the reader's attention was called to the fact that "participation in learning activities is secured in two ways: (1) by assigning exercises, and (2) by discovering what students want to do and guiding their efforts to do these things so that they will engage in appropriate learning activities." According to the "assignment method," which is typical of present-day teaching, exercises assigned by the teacher constitute the basis of the learning activities of the students in school. In addition to assigning exercises to be done, the teacher employs certain procedures for securing an appropriate mind set, stimulating the doing of the exercises, and directing the activities of his students. The "project method" represents a distinctly different approach to the stimulation of pupil-participation in appropriate learning activities. No assignments are made. Instead, the pupils are given an opportunity and encouraged to do things they want to do. This does not mean that they are allowed to do as they please and are subject to no restraint or direction. Spontaneous proposals by the pupils which do not appear to lead to highly educative activity may be discouraged or even vetoed by the teacher. On the other hand, the teacher may stimulate purposing by the pupils and even suggest projects, but direct assignments have no place in the project method.

The discussions of the preceding chapters have implied the assignment method. However, the project method has a place in high-school teaching. Some of its advocates assert that it should become the prevailing plan of instruction. The writer does not agree with this hypothesis. It is his conviction that most of the instruction in secondary schools will inevitably be based on the assignment method. On the other hand, the project method has certain distinctive merits and when conditions are appropriate, it is advantageous to employ it.

The problems of this chapter.—The two central problems of this chapter are:

1. How may the teacher stimulate his students to form purposes?
2. What procedures should the teacher employ in directing their efforts to realize their purposes?

The explicit consideration of these problems will be approached by an exposition of the project method.

A definition of the term "project."—Although the term "project" has become widely used in educational literature only recently, it is not a new word. For many years it has been used by the United States Department of Agriculture to designate "carefully planned investigations in agricultural science covering a considerable period of time." Stevenson¹ states that the first use of "project" as designating an instructional procedure was by R. W. Stimson who employed the phrase "home project" about 1908 to designate a type of vocational agricultural education. Within a few years the term "project" began to be used by teachers of manual arts and science to designate a type of

¹STEVENSON, J. A.—*The Project Method of Teaching*. New York: The Macmillan Company, 1921, p. 40.

instructional procedure and now it is employed by teachers in other fields.

A variety of definitions have been proposed for "project" as the term is now used, but the one formulated by Kilpatrick appears to offer the most helpful description of the instructional procedure designated by it. He defines a project to be "any unit of purposeful experience, any instance of purposeful activity where the dominating purpose, as an inner urge, (1) fixes the aim of the action, (2) guides its process, and (3) furnishes its drive, its inner motivation."¹ A somewhat different definition is given by Stevenson² who states that "a project is a problematic act carried to completion in its natural setting." This definition is not necessarily incompatible with the one by Kilpatrick but it emphasizes different phases. The requirement that the act be "carried to completion" is necessary for a complete project and might be considered as implied in Kilpatrick's statement. In addition the three characteristics enumerated furnish a basis for considering the instructional procedures that should be employed in directing learning activity based on projects.

Types of projects.—In elaborating his definition of a project, Kilpatrick describes four types:

1. *Construction projects.*—Experiences in which the dominating purpose is to do, to make, or to effect.
2. *Enjoyment projects.*—In these the student purposes participation in an activity because he desires the enjoyment or satisfaction which it appears to afford.
3. *Problem projects.*—In order for a problem to become a project, the student must purpose the solving of it.³

¹KILPATRICK, W. H.—"Introductory Statement: Definition of Terms," *Teachers College Record* 22:283, September, 1921.

²*Ibid.* p. 43.

³See the discussion of problems on page 240.

4. *Learning projects*.—In this type of project the purpose is “to acquire some item or degree of knowledge or skill.”

Recognition of these types of projects gives the term a more comprehensive meaning than is usually associated with it. The reader may ask if we do not have learning projects and possibly enjoyment projects when assignments are properly motivated. Although it is likely that authorities would not agree on the answer to this question, it appears that Kilpatrick would say that an assigned exercise becomes a project when the pupil purposes the doing of it, provided that this purpose “fixes the aim of the action” and guides the efforts the pupil makes to realize this aim. This, however, is not the usual meaning of a project.

The project method a point of view, not a Teaching formula.—The word “method” tends to suggest a procedure, a formula for the conduct of recitations, and for this reason the phrase “project method” is misleading. The “project method” is not a teaching formula; it is a point of view, a philosophy of education. According to it the specific habits, knowledge, and general patterns of conduct specified by our educational objectives are to be acquired by children as by-products as they strive to realize their purposes.¹

The project method has been described as a “method of living” which appears to mean that when the formal education of children conforms to it, the school conditions approach those under which they learn as they endeavor to realize purposes outside of the school. Hosis has described the project method as “providing opportunity for children to engage in living, in satisfying, worth-while

¹This statement does not apply to “learning projects.”

enterprises—worth-while for them; . . . guiding and assisting them to *participate* in these enterprises so that they may reap to the full the possible benefits.”¹

In seeking to arrive at an understanding of this point of view one should bear in mind that it is not new in the sense that the term “project method” is new. Elements of it may be found in the writings of Rousseau and Pestalozzi, and Dewey illustrated it in the University Elementary School described in the monograph, *The School and Society*, written in 1899. Phases of the project method are to be found in many discussions of teaching, especially those explicitly dealing with motivation.² In fact, it has been suggested that the project method represents a coherent synthesis of many of the best ideas about teaching which have been evolved since 1900 or a little earlier. Bagley³ has stated that considered as such “it already ranks as a constructive achievement of the first magnitude.”

The point of view of the assignment method.—When employing the assignment method the attention of the teacher is focused upon controls of conduct (specific habits, knowledge, and general patterns of conduct) that it appears desirable to have children learn, and he devises and selects exercises which in his judgment will furnish the basis for the necessary learning activities. The essential point of contrast between this method and the project method is that under the latter the teacher focuses his efforts upon ascertaining what his students want to do,

¹HOSIC, JAMES F., and CHASE, SARA E.—*A Brief Guide to the Project Method*. Yonkers: World Book Company, 1924, p. 7.

²For example: see CHARTERS, W. W.—*Methods of Teaching, Revised and Enlarged*. Chicago: Row, Peterson and Company, 1912, pp. 146-83.

³BAGLEY, WILLIAM C.—“Projects and Purposes in Teaching and in Learning,” *Teachers College Record*, 22:288, September, 1921.

i. e., what their purposes are, and upon directing their efforts to realize these purposes in such a way that they will attain the immediate objectives of the school. It is true that a pupil may purpose the doing of an assigned exercise and when this occurs the "assignment method" tends to be equivalent to the project method so far as the pupil is concerned, but the teacher's point of view or attitude is fundamentally different.

The reader should bear in mind that points of view or attitudes toward the education of children are being contrasted rather than classroom procedures, although these also will tend to differ. Furthermore, the two points of view are not mutually exclusive, at least as represented in educational practice. The project method does not mean that the pupils are free to do as they please. The efficient teacher guides them in their purposing and at times even restrains them. Published accounts of school projects show that in the course of the work exercises are not infrequently assigned. They usually relate to the purpose the pupils are attempting to realize and the assignment may be made very tactfully and perhaps indirectly but the exercises call for activity that probably would not occur in the absence of the assignment.

On the other hand, the "assignment method" as now conceived in theory and represented in much of our educational practice is not opposed to utilizing children's purposes as a basis of educative activity. Current discussions of motivation, which is a phase of instructional procedure associated with the "assignment method," insist that the teacher should endeavor to get his pupils to *purpose* the doing of the exercises assigned.¹ Teachers who approach

¹See the discussion of motivation by creating a need, page 90f.

their work with the attitude of the "assignment method" frequently succeed in getting their pupils to purpose the doing of some or even most of the exercises they assign. The secret of their success is their skill in motivating learning activity and in this phase of their work they may approach the project method so far as procedures are concerned, although their point of view is essentially different.

The attitude represented by the often-quoted statement, "It doesn't matter what a boy studies as long as he doesn't like it," is frequently associated with the "assignment method," but it is incompatible with this method as it is now conceived. Other things being equal it is desirable that the pupil enjoy doing the exercises assigned. The advocates of the "assignment method," at least the more progressive ones, maintain that the teacher should capitalize children's purposes in motivating the doing of the learning exercises he assigns. Furthermore, they would have the teacher adapt his learning exercises to the interests of his students. When defined in this way the "assignment method" approaches the project method. In fact, some of the advocates of the latter method would probably insist that it becomes the project method. Kilpatrick's inclusion of "learning projects" and "enjoyment projects" suggests the recognition of exercises that are "assigned" by the teacher but doubtless he would have the assignments made indirectly so that the students would not be aware that the teacher was imposing his purposes on them.

Illustrations of projects.—Many projects have been described in our educational literature, but most of them have been carried on in the elementary school, especially in the primary and intermediate grades. The *Twentieth Yearbook* of the National Society for the Study of Educa-

tion, Part I,¹ presents a compilation of descriptions of 285 projects.² A number of sample projects are described in Hosis and Chase, *A Brief Guide to the Project Method*.³ Collings⁴ lists by title the projects worked out in a four-year experiment in a rural school and describes a number of representative ones. The following is a brief summary of the description of a "Corn Fair" which was carried out by a group of upper-grade children.

In discussing a visit to a "Harvest Show" in a neighboring town the students proposed organizing a similar enterprise for their own community.⁵ At subsequent conferences of the group the project was planned, the teacher making occasional suggestions. First a general program was agreed upon and committees were appointed for the following activities: (1) Exhibits, (2) Speakers, (3) Dinner, (4) Prizes and Judges, (5) Date, and (6) Demonstrations. Other committees were appointed for executing certain phases of the project. In carrying out the plans, programs and posters were printed. Each pupil planned and made one or more exhibits. Certain ones practiced demonstrations to give at the fair.

At the first conference after the "Corn Fair" the project was discussed. The teacher remarked that the fair had been successful, everything working out as they had planned it. She, however, suggested that if another one

¹Published by the Public School Publishing Company, Bloomington, Illinois, 1921.

²Very few of these projects appear to be based on purposes originated by the pupils. Hence a more appropriate name would be "assigned projects," or "problem projects."

³Published by the World Book Company, Yonkers, New York, 1924.

⁴COLLINGS, ELLSWORTH.—*An Experiment with a Project Curriculum*. New York: The Macmillan Company, 1923, pp. 50-222.

⁵Four neighboring schools were invited to participate in the "Corn Fair."

was held certain improvements could be made. The pupils also made a number of suggestions. At the request of the editor of the local paper the children wrote an account of their "Corn Fair" and at a conference they read the various articles that had been written. The one they considered best was chosen to send to the editor.

It is apparent from Collings's account that throughout this project the teacher was in the background. The pupils planned the various things to be done and did the work. The teacher offered a few suggestions, but many more came from the pupils. The group also criticized suggestions made by its members. The purpose also was the children's. The teacher probably assisted in its development, and perhaps may have been somewhat responsible for initiating it, but it was clearly a pupil project and not imposed by the teacher and the school.

Collings also describes how the illness of two members of the intermediate group formed the basis of a study of the causes of typhoid fever.¹ This in turn led to a study of the prevalence of diseases in the community and how to combat the house-fly. A report of the study of the prevalence of diseases formed the program of a community meeting at the school building.

Hotchkiss² describes a project that grew out of a pupil asking, "Why is Africa called the Dark Continent?" In attempting to secure the answer to this question, it became apparent that the class did not have an adequate concept of the topography, climate, vegetation, and so forth of this continent and plans were suggested and discussed for making Africa better known to the class and

¹COLLINGS, ELLSWORTH.—*Op. cit.*, p. 54.

²HOTCHKISS, E. A.—*The Project Method in Classroom Work*. Boston: Ginn and Company, 1924, pp. 55-71.

to other children in the school. It was decided to construct a large sand map on which would be represented all of the information about Africa the class could assemble.

A seed store project¹ was initiated during a study of seeds by the teacher asking the children "if they would like to have a seed store in school and they, of course, were most enthusiastic." The class made (1) a seed store of big blocks, (2) boxes for seeds, (3) labels for the different kinds of seeds, and (4) baskets in which to gather the seeds.

A study of municipal sanitation grew out of the question, "Why should a city have pure water?"² When it was found that the class could not answer this question, a committee consulted the city engineer and arranged for a visit to the city water plant. Another committee visited the city health office and gathered data on health conditions in the city.

The lack of satisfactory information concerning vocations resulted in a class of junior high-school pupils taking the initiative in collecting this much-needed information for the school library.

Each pupil volunteered to obtain personal interviews from at least five prominent persons in the professions, trades, commercial lines, management, manufacturing, or farming, and to report these to the class for discussion. A series of questions was agreed upon by the class. Committees were formed to take charge of each type of interview, as lawyers, physicians, and so forth and to work over material collected and to formulate one comprehensive report on its vocation.³

¹The *Twentieth Yearbook* of the National Society for the Study of Education, Part I. Bloomington, Illinois: Public School Publishing Company, 1921, p. 6.

²*Ibid.*, p. 140.

³*Ibid.*, p. 166.

Problem method versus project method.—There appears to be some confusion between the project method and what may more appropriately be designated as the problem method.¹ In some educational writings this confusion is explicitly recognized by the use of the term “problem projects.” A problem has many characteristics in common with a project. Both are occasions for reflective thinking; usually they represent relatively large units, sometimes their completion extending over several days or even weeks. A difficulty or need is recognized by the student. The significant difference is that the problem is assigned or at least created by the teacher; a project is originated by the students. This difference is one of degree and consequently no definite line of demarcation can be drawn between the two instructional procedures. A project always involves one or more problems, but a problem is not necessarily a project.

Relation of project method to socialized recitation.—The project method obviously requires modifications of the traditional classroom procedure. When it is the dominant mode of instruction assignments are abolished and there can be no fixed course of study. Unless arbitrary requirements are imposed by the teacher or the school, there will be an approach to the socialized recitation,² but socialization of classroom procedure, at least as found in many schools, may be combined with the assignment method.

The relative efficiency of the assignment method and the project method.—A method of teaching is not good or efficient because it is new and has advocates who advertise it extensively; a method of teaching is not inefficient or

¹See second footnote on page 453.

²For a description of the socialized recitation, see Chapter XI, page 369f.

undesirable because it is old and may be labeled "traditional." The merits of an instructional procedure are determined by its effectiveness in engendering the specific habits, knowledge, and general patterns of conduct recognized as immediate objectives. Hence the logical way to determine the relative efficiency of the assignment method and the project method would be to have the two methods employed under similar conditions and then to measure the resulting effects upon the achievements of the pupils.

Collings¹ has reported an experiment in which he compared the project method applied to the entire curriculum of a rural school with the usual course of study and methods of instruction. In the experimental school no subjects were taught. The pupils, 41 in number, were divided into three groups. The method of creating purposes and selecting those to be utilized as a basis of learning activity is described by Collings under the head of "curriculum principles." The essentials of the procedure are: (1) the suggestion of purposes (potential projects) by both teacher and pupils; (2) a discussion by the members of the group, including the teacher, of the value and feasibility of the proposed projects; and (3) the selection of one for group participation, the majority determining the choice.

At the close of the experiment which extended over a period of four years the following tests were given in both the experimental school and two control schools.

THORNDIKE-McCALL—Reading Scale, Form I (grades four to eight inclusive).

HAGGERTY—Reading Examination, Sigma I, Form I (grades one to three inclusive).

¹COLLINGS, ELLSWORTH.—*An Experiment with a Project Curriculum*. New York: The Macmillan Company, 1923, 346 pp.

VAN WAGENEN—American History Scales, Information Scale A.

HILLEGAS—Scale for the Measurement of Quality in English composition.

WOODY—Arithmetic Scales, Series B (grades four to eight inclusive).

COLLINGS—Tests for Measuring the Four Fundamental Operations in Arithmetic (for the first four grades).

STARCH—Spelling Scales, Forms 1 and 2.

THORNDIKE—Scale for Measuring Handwriting.

HAHN-LACKEY—Geography Scale.

National Intelligence Tests, Scale A, Form I (grades four to eight inclusive.)

HAGGERTY—Intelligence Examination, Delta I (grades one to three inclusive).

In addition Collings considered such items as "per cent of pupils enumerated in district enrolled in school," "attendance, truancy, cases of corporal punishment," "per cent of parents visiting the school during the school year," and changes in community life.

The average of all test scores for the experimental school was 38 per cent greater than the corresponding average of the control schools taken together. Although the tests used do not yield highly accurate scores and do not measure all achievements but only certain ones, the results tend to be convincing, especially when considered in connection with the data¹ relating to the conduct of pupils, the attitude of parents, and the life of the community. However, when one inquires concerning the equivalence of the experimental school and the two control schools, he finds several factors other than the curriculum and the associated instructional procedures that differ. Among those that Collings lists are: (1) library and equipment, being distinctly superior in the

¹These are distinctly favorable to the experimental school.

experimental school; (2) number of teachers (a second teacher was employed in the experimental school at the middle of the first year¹); (3) weekly community meetings in which the pupils participated were "an integral part of the procedure" of the experimental school in contrast with about six community meetings of the "adult type" in the control schools; and (4) a distinctly greater amount of supervision of the experimental school. In addition to the factors that Collings lists, one suspects that the teachers in the experimental school together with Collings who was the supervisor (county superintendent) exhibited much greater zeal and enthusiasm and invested more energy in the work than did the teachers in the control schools.

In view of these and other variable factors it does not appear that this experiment answers the question concerning the relative merits of the assignment method and the project method in general. The data appear to justify the assertion that the project method as employed in the experimental school was successful but they probably do not justify the conclusion that under "normal" conditions the project method would be more efficient than, or even as efficient as, the conventional curriculum and the assignment method.

Gates² has reported a controlled experiment with two groups of first-grade children that favors what he designates as "a modern systematic method." The teacher employing this method followed a course of study and assigned exercises. The methods of stimulating and directing the doing of these exercises were intended to be compatible

¹This condition is partially offset by the fact that the enrollment in the experimental school was 41 and only 29 and 31 in the control schools.

²GATES, ARTHUR I.—"A Modern Systematic Versus an Opportunistic Method of Teaching," *Teachers College Record*, 27:679-700, April, 1926.

with sound educational principles. The "opportunistic method" was essentially the same as that designated in this chapter as the project method. At the end of the year the "systematic group" exhibited distinctly higher average achievements in arithmetic, spelling, silent and oral reading. In addition, the distributions of achievements about the average showed significant differences. "In reading, for example, in the Opportunistic group, there was what a standard test in reading of simplest materials designates as 'complete failure' in 15 out of 25 cases; whereas in the Modern Systematic group there was none." Although the experiment is not conclusive and caution must be exercised in applying the results to the secondary level, it indicates that unqualified advocacy of the project method is not justified, at least until more evidence is available.

Logical evidence.—Since the experimental evidence is not conclusive, it will be helpful to note certain logical considerations. In the first place, one may properly raise the question whether the realization of purposes in which skills and information are used as tools may always be expected to result in the degree of mastery that is specified by our educational objectives. If we grant that the execution of a project represents a highly efficient initial learning of skills and information, it does not necessarily follow that projects alone will provide sufficient learning activity for the attainment of the desired degree of mastery or that project activity is the most efficient learning activity for the attainment of all objectives. When the student's purpose is merely one for which certain controls of conduct are needed as tools, the learning of them may stop short of the degree of mastery considered desirable. Of course if one accepts Kilpatrick's definition of a project and the

type of project in which the student purposes the acquiring of certain specific habits or other controls of conduct, he will be forced to admit that when such a project is formed by a student, the ensuing project activity will represent the optimum learning activity, provided that it conforms to the laws of learning.

The significance of the provision attached to the preceding statement is illustrated in the acquisition of skills necessary for the efficient operation of a typewriter. A student who purposes the acquisition of these skills will probably not engage in efficient learning activities, if he is simply provided with a typewriter and permitted to achieve his purpose in his own way. It is not likely that undirected he will choose the best practice exercises or distribute his periods of practice in the best way. The dominating purpose is not sufficient to insure efficient learning. Direction by the teacher including the assignment, or at least the suggestion, of exercises, and distribution of practice periods appears necessary for maximum efficiency. However, the presence of a dominating desire to learn contributes greatly to the efficacy of the child's efforts.

On the other hand, it should be noted that as one practices in acquiring motor skills, memorizes a formula, rule, poem, dates in history or other facts, solves problems, reads a textbook, or engages in other learning activities, certain general patterns of conduct tend to be produced as by-products in addition to the direct outcomes. The latter tend to be obvious to both the teacher and learner, but the by-products (ideals, attitudes, interests, tastes, perspectives, and the like) tend to be intangible and frequently there is little evidence of their existence. However, in general, as a pupil studies arithmetic he is acquiring at-

titudes and interests as well as learning arithmetic; as he studies history he learns facts, meanings, and principles but he also is building up general patterns of conduct.

It appears that the project method creates conditions which are distinctly favorable to the production of by-products, especially those commonly designated as initiative, resourcefulness, self-confidence, coöperation, willingness to assume responsibility, persistence, interest in the field of activity, and the like. The extent to which the conditions essential to the engendering of such general patterns of conduct are more apt to be secured under the project method than under the "assignment method" is a question on which there are differences of opinion. In the judgment of the writer, the method to which the teacher subscribes is in general less important than his sensitiveness in detecting opportunities for engendering patterns of conduct and his skill in handling the opportunities that arise.¹

Relation of the project method to the curriculum.—We have been accustomed to think of the curriculum of the school in terms of certain subjects—reading, writing, arithmetic, spelling, history, algebra, Latin, physics, manual training, etc., which represent certain groups of controls of conduct to be acquired, that is, certain facts to be memorized, certain abstract and general meanings to be comprehended, certain rules and principles to be mastered, and the like. It has been considered important that each child study the prescribed subjects and cover the prescribed content of each. During recent years this concept of the school has been modified, especially in the kindergarten and primary grades, but many teachers as well as the great majority of the general public still con-

¹See page 328 f for the discussion of engendering general patterns of conduct.

sider it vital that the school have a definite curriculum and that the "ground" prescribed by it be covered by all pupils who are rated as "passing."

The project method implies a concept of school work which when contrasted with that of a definite curriculum may be called revolutionary. Since under the project method the activity of the pupil is devoted to the realization of his purposes, the "ground" he covers is determined by them, and in view of the differences that children exhibit it is obvious that, unless they are subject to more rigid direction than is compatible with the project method as interpreted by most of its advocates, the pupils completing a division of our school system will differ in the content of their achievements.

Until recently the desirability of a definite content for each school subject and hence a uniform content for all students who take the same subjects has not been considered a debatable question by most educators. On the other hand, an increasing number of students of education are maintaining that uniformity of content is not essential and perhaps, all things considered, not desirable. As is the case in many controversies there appears to be some truth on both sides. In general, it is desirable that a school formulate a curriculum, but the degree of its definiteness and conformity to it may properly vary with the maturity of the students, the training of the teachers, and the expertness of the supervision of instruction. Other things being equal, a definite curriculum and conformity to it appear least desirable in the kindergarten and the graduate school of the university; they are probably most desirable from the fourth grade through the ninth. They are more desirable in the "tool" subjects than in the "content" subjects.

If all of the school activity of pupils is based on projects,

their learning will not conform to a definite curriculum unless their purposing is directed by the teacher to a greater extent than the project method assumes. At some stages of school work and in some phases at all stages certain departures from a definite curriculum may be justified. Any undesirable departures may be adjusted by the assignment of learning exercises designed to fill in the gaps. The extent of these gaps, and hence the need for the assignment of learning exercises, will depend upon the resourcefulness and skill of the teacher in directing the purposing of his students. Under favorable conditions such as existed in Collings's experiment (see page 457) there may be no undesirable gaps. The project method may be employed, sometimes extensively, without undesirable departures from a curriculum typical of those now adhered to by our schools.

Relation of the project method to the level of intelligence.—Our study of the intelligence of children has led to the conviction that instructional procedures should be adjusted to their capacity to learn. In general, a given procedure is not equally effective with all children of a given age or even with all who belong to the same school grade. The project method represents a general procedure and thus some adaptation to individual differences may be made, but one may properly raise the question, "Is the project method equally appropriate for all levels of intelligence?"

Intelligence is commonly defined in general terms as "capacity to learn" or somewhat more specifically as "capacity to do school tasks." Either as phases of this capacity or as additional traits children exhibit curiosity, interests, initiative, resourcefulness, perseverance, enterprise, and the like. Children who are low in the scale of intelligence

are usually lacking in curiosity concerning their environment, have few interests, exhibit little initiative, are not resourceful, seldom persevere, and are not enterprising. On the other hand, bright children tend to exhibit the opposite characteristics. It is therefore apparent that bright children are more likely to have purposes they wish to realize, and when they do not it will be relatively easy for the teacher to stimulate purposing. We recognize this fact by describing bright children as leaders. On the other hand, children possessing only average or less than average intelligence have few interests and as a rule it will be difficult for the teacher to stimulate a dominating purpose that will "fix the aim of action, guide its processes, and furnish the necessary driving force."

The considerations of the preceding paragraphs appear to justify the conclusion that the project method will be more effective with students on the higher levels of intelligence than with those on the lower levels. It appears doubtful if many of the latter can be stimulated to purpose the doing of a sufficient number of things to provide much of the activity required to educate them.

Conclusion in regard to the relative merit of the assignment method and the project method.—It has doubtless been apparent to the reader of the preceding pages that in the judgment of the writer both the assignment method and the project method have merit. There appears to be no doubt that, as employed by some teachers, the project method is a highly efficient instructional procedure. It does not follow, however, that if the assignment method were completely replaced by it, the efficiency of our schools would be increased. It appears that sometimes the assignment method is superior, especially when fundamental skills are to be mastered. Hence, it appears reasonable to

conclude that: (1) a teacher should afford opportunity for his students to realize the purposes they announce, provided the proposals appear to be worth while; (2) a teacher should encourage purposive and cultivate embryonic purposes; (3) on the other hand, the teacher should expect to employ the assignment method whenever his students fail to propose appropriate projects. In many cases this will mean that the assignment method is the predominant instructional procedure.¹

¹The statements of two writers are quoted in support of this conclusion.

"I am inclined to the belief that, if provision is made for giving children scope and opportunity to work out many of their spontaneous purposes, there can well be some measure of controlled and directed activity to take care of the types of learning which our adult judgment deems essential and which the child may not happen to hit upon accidentally. Until further evidence is available, I should say that it is better that he should be encouraged to accept this control as a matter of course, than that we should attempt to delude him into the belief that he is making a free choice when in reality the choice is made by someone else. . . . Instead of decrying adult control as a necessary evil, we see it now as an essential virtue through the agency of which, and *primarily through the agency of which*, human progress has been made possible. The great educational problem is to use it wisely but not to abuse it; to recognize where it should stop but not to abandon it entirely even in theory." (BAGLEY, WILLIAM C.—"Projects and Purposes in Teaching and Learning," *Teachers College Record*, 22:295, September, 1921).

"In general, I believe this principle will be found to hold. If the knowledge or skill is of such a character that undesirable results follow directly from failure, purposeful activity may be depended upon to build up slowly, by trial and error methods, correct habits and adequate degrees of skill. But if the operation of the habit or skill is obscure, so that cause and effect may not be easily and directly traced, mere activity, except by chance, will not produce the desired result.

"Our civilization is the product of an age-long evolution in which the best solutions for our common problems have been slowly and laboriously built up by the master minds of the ages. The basic function of the school is to transmit this social inheritance to the oncoming generation. Other things being equal, the more efficiently this duty is discharged, the greater will be the contribution to the social progress which the new generation will make.

"From this point of view the school must not only see to it that the child acquires the fundamental skills, but also that he wastes no time in doing so. If compulsory drill exercises under expert teaching will short-circuit the slow evolutionary development which comes from the use of skill in purposeful activity, then not to drill a child is to handicap both him and society.

"I can find nothing intrinsically wrong with drill. Under right conditions and

Directing the formation of projects.¹—A project cannot be assigned. Students will not form project purposes upon demand. The teacher's direction of this phase of the project method must be "behind the scenes." Some students may come to the class with an embryonic purpose. These must be discovered and cultivated. Usually a conference period is provided, and it is during this time that the teacher should be alert in discovering purposes and in guiding discussions so that purposes will be formed. The children should be encouraged to suggest things which they wish to do, but it will seldom be wise for the teacher to approach the group with the direct inquiry, "What would you like to do?" However, the teacher may ask questions which will lead to the formation of purposes. For example, if the teacher of physics has in mind a visit to some local industry, such as an ice plant, he might ask how many have visited the plant, or question them concerning what one might see. If it is understood by the class that projects are "fashionable" it is likely that some student will suggest that the class make a visit. Occasionally the teacher may

done with the proper motives, it is one of the most efficient forms of educational activity. It is true that all persons do not need drill. Even in Gary in all the elementary grades there were children who had spent their entire educational lives in the Gary schools, yet who were able to spell perfectly the tests for their grade. There are individuals who without drill are able to drive an automobile or an aeroplane the first time they try it, who, in other words, learn so readily by doing that they need no other training. The essential point to notice, however, is that the number of such individuals is small. On the basis of such measurements as have been made we can say with some definiteness that the number of children who are 'natural-born' spellers is approximately ten per cent of the total. For the other 90 per cent the acquisition of adequate skill involves either a prolonged period of purposeful activity or some form of direct drill." (COURTIS, STUART A.—"Teaching through the Use of Projects or Purposeful Acts," *Teachers College Record*, 21:142-44, 146, March, 1920.

¹Directing the formation of projects is very similar to creating a need and the reader will find it very helpful to study pages 90 to 101 in connection with the following discussion.

be approached by his students with a request to be allowed to do something. The beginning of a construction project is described as follows: "One noon a boy came to me early and said: 'Eight of us boys from the class belong to a club at the church and we want a bulletin board. Could we make one? Of course we want to pay for the lumber.' I said, 'Yes, if you will do it all.' And before they were through, they discovered the doing it all meant more than paying for the value of the lumber and the actual work of making the board."¹ This group found it necessary to determine what kind of lumber to use, how much lumber to buy, and the design of the bulletin board.

When students suggest inappropriate purposes it becomes necessary for the teacher to exercise his power of veto, but this should be done tactfully. Furthermore, it is important that the teacher judge proposals with reference to appropriate standards. He may wish the students to engage in certain projects, but this is not a valid reason for vetoing a proposal for a different project. The first consideration is that the project involve valuable learning activities. If this condition is met the proposal should usually be accepted although occasionally it may be necessary for the teacher to veto it on the ground of inexperience or lack of facilities. The teacher should be careful not to discourage the initiative of students in forming purposes. In fact, it is very desirable to cultivate this trait, but it should be clearly understood that the application of the project method does not mean that no control is to be exercised over the impulses and desires of children. They should not be allowed to run wild. Teaching by projects

¹The *Twentieth Yearbook* of the National Society for the Study of Education, Part I. Bloomington, Illinois: Public School Publishing Company, 1921, pp. 166-67.

does not mean that the children will be allowed to do just as they please.

In stimulating the formation of purposes, the important requirement is that the teacher demonstrate a sympathetic receptiveness to proposals of projects and that he be alert in detecting symptoms of embryonic purposes. Many projects have started with a question asked by a pupil; if he is sincere, it represents a desire to know, a purpose. A teacher can easily discourage a questioning attitude on the part of his pupils by ignoring their questions or by pronouncing those of which he does not approve as irrelevant or silly. The ridicule and even sarcasm which not infrequently greet strange and awkwardly worded questions have undoubtedly killed or discouraged many developing purposes. It is obvious that the project method requires that the teacher respond courteously and sympathetically to any sincere question asked by a pupil.¹

The problem project affords an approach to the project method. A problem project is an assigned exercise, but it differs from a project only in this respect. If the assignment is made in such a way that the students purpose the doing of the exercise, the subsequent stages of their activity need not differ from that occurring in carrying out a project. In assigning a problem project it is frequently effective for the teacher to ask, "Would you like to . . . ?" "Do you think it would be profitable to . . . ?" For such a procedure to be effective, the teacher must secure an affirmative response.

Directing the planning and execution of projects.²—A

¹For an interesting account of projects developed from questions asked by pupils, see: LINKE, EDITH A.—"An Experiment in Teaching in Response to Children's Questions," *Teachers College Record*, 21:55-67, January, 1920.

²Many of the principles set forth in Chapter VIII are also applicable to directing the execution of projects.

fundamental principle is that no learning activity should be forced upon the students as a part of the project. The teacher should encourage initiative on the part of the students in planning the things to be done in the execution of the project. It is not necessary that the plans be perfect. The ultimate purpose of the project is the education of the child and not any material outcomes. Hence, mistakes may be profitable, but in general the teacher should endeavor to guide the student so that there will be a minimum of "wasted effort." In the case of group projects a conference period should be devoted to talking over plans. The various members of the group should be given an opportunity to criticize proposals and to make suggestions. If the children fail to suggest a plan which the teacher believes should receive consideration he, as one of the group, may make suggestions. He may also criticize proposals although it will generally be wise to exercise considerable caution in doing this. It will frequently be helpful for the children to try out plans and learn their defects. Experiences of this type will tend to make them more cautious in planning future projects. Many projects require extensive reading to secure necessary information. The teacher may direct the students to sources of information when it is likely that they would waste time in searching for them, or would likely fail to find them. In some instances he may give information but in this, as in other phases, the teacher should be careful to avoid discouraging initiative and self-reliance.

Frequently one project may suggest related ones. The teacher should be alert and note any embryonic purposes which could be developed to form the basis of valuable supplementary or related projects. There is, however, one caution which should be mentioned in this connection.

Students should not be allowed to drop one project before it is completed in order to take up another. In case they are tired of a project, it will usually be best to return to the regular school work, or to consider the uncompleted project as a school exercise which is being done at the request of the teacher. There should be a general understanding that anything the student starts is to be finished unless it develops that it is unwise to continue the work. A mere lack of interest should not be accepted as a legitimate excuse for discontinuing the undertaking.

A prominent phase of the teacher's task is measuring the achievements of his students. The project method does not prohibit the measuring of achievements although it does minimize it. Under the project method there will be no formal recitations. During the conference period reports of progress may be asked for if the nature of the project is such that they are appropriate. In all cases the teacher should keep informed in regard to the status of the work of each member of the group, but he should constantly bear in mind that a project must be labeled as a failure if children are not educated by participating in it. The material products are much less important than what the children learn.

LEARNING EXERCISES FOR THE READER

1. What are the essential differences between the assignment method and the project method?
2. What is a problem project?
3. How does the project method differ from laboratorized instruction?
4. How does the project method differ from the socialized recitation?
5. Bobbitt (*Curriculum Construction*, Chapters II and III)

discusses the "play-level" and the "work-level." How does "educational experience on the play-level" differ from the project method?

6. The need of a balanced ration of learning activities has been emphasized in several of the preceding chapters. How would a balanced ration of learning activities be secured under the project method?

7. Were any of your teachers inclined to discourage the asking of questions by the members of the class? If so, what was the effect upon you?

8. Compare the project method and motivation by creating a need.

9. Suggest several suitable problem projects for some high-school subject.

10. Show how adjustments to individual differences might be made under the project method.

11. Would the project method make the management of classes more difficult? Give your reasons.

12. What is meant by saying that the project method represents a point of view? See page 449.

13. Why is it difficult to determine scientifically the relative merits of instructional procedures?

14. What do we mean when we designate a procedure as a "fad"?

CHAPTER XV

MEASUREMENT OF ACHIEVEMENT, GENERAL PRINCIPLES¹

The problem of this chapter.—Measurement of achievement has been considered in several of the preceding chapters as an essential phase of instruction. In addition to fulfilling his responsibilities in stimulating and directing the learning activities of his students, a teacher is usually expected to determine and report measures of the total achievements of his students in the form of grades. In measuring achievement, the teacher encounters first the problem of determining what is to be measured and then he faces the necessity of devising or selecting a suitable procedure for making the measures desired. Preparatory to the explicit discussion of these major topics, it will be helpful to consider the meaning of “measurement of achievement” and certain other general concepts.

The meaning of “measurement² of achievement.”—To measure means to describe quantitatively, to determine how much, how large, how fast, how well, and the like. Hence, to “measure achievement” means to determine

¹It is suggested that Chapters XV and XVI be omitted if the students are required to take a separate course on educational measurements. However, the writer does not recommend a separate course for prospective high-school teachers.

²There are four measurement procedures: (1) informal estimating, (2) written examinations of the essay type, (3) “new examinations,” and (4) standardized tests. (See page 503 f.) Unless an explicit restriction is made, the discussion of this chapter applies to all four procedures.

how much a student has achieved or learned, but this definition does not represent adequately the meaning of the phrase. "Ability to do," commonly called achievement, is not general but is a composite of elements from one or more of the three general rubrics of controls of conduct: specific habits, knowledge, and patterns of conduct. For example, ability to solve simple algebraic equations represents a composite of controls of conduct, mostly specific habits. Ability in first-year algebra is a very complex composite of specific habits, knowledge, and patterns of conduct. Hence, measurement of ability to solve simple algebraic equations, ability in geometry, ability in Latin, and the like means the measurement of a large number of elements.

"Ability to do" is not directly observable. A teacher cannot measure a student's ability to do by looking at him or even by making physical measurements of his skull or other parts of his anatomy. Ability to do can be known only through the observable performances that a student gives. Hence, achievement is measured by measuring performance. A more complete and precise statement of this fundamental principle is, "the magnitude of a student's achievement (ability to do in a given field) is inferred from measures of certain observable performances."

The doing of some learning exercises provides a performance that the teacher may observe and evaluate with respect to accuracy and other significant qualities, but the learning performances of students are not always dependable indices of what they learn. For example, two students may do the same laboratory exercises and turn in reports that appear to be equivalent in merit, but one student may have learned much more than the other. In fact, the student whose achievement is inferior may present the

report that appears to deserve the higher rating. For this reason in measuring achievement it is usually necessary to secure a performance especially designed to demonstrate the possession of the abilities that the teacher desires to measure. Hence, an important phase of the measurement of achievement is the devising of exercises that will furnish a basis for suitable performances.

Definition of qualifying terms.—To understand the meaning of “diagnostic” as it is most frequently used it is necessary to recall that “ability to do,” or achievement, is usually a composite of a number of controls of conduct. “Diagnostic measurement” is used to designate the measurement of the elemental controls of conduct either separately or in relatively small homogeneous groups. For example, diagnostic measurement in first-year algebra requires that one measure separately the abilities to add algebraic expressions; to factor perfect squares, the difference of two squares, and other expressions; to solve simple equations; to solve simultaneous equations; to solve quadratic equations, etc. Each of these abilities represents a composite of several more elemental abilities. For example, “ability to solve simple equations” includes ability to clear an equation of fractions, ability to remove parentheses, ability to transpose terms, ability to add similar terms, and ability to find the value of x from equations of the type, $ax=b$. A more detailed diagnosis would require that each of these abilities, which in turn represents a composite of controls of conduct, be measured separately.

The opposite of “diagnostic measurement” is “general measurement” but since both terms designate a relative rather than an absolute condition, a given measurement may be diagnostic when considered in relation to another, and general when compared with a third. A general meas-

ure of a given composite ability may be obtained by calculating an average or other composite from the diagnostic measures. When obtained in this way a general measure may be described as "complete." A general measure of a composite ability may also be obtained by measuring only representative elements of it. In such a case we describe the general measure as "sample" to distinguish it from those that may be designated as "complete."

These four qualifying terms—diagnostic, general, complete, and sample—represent important concepts in the field of educational measurement and the reader should make certain that he understands their meaning fully. The need for such differentiating terms is due to the fact that ability, although used in a general sense, is essentially specific, that is, it consists of particular specific habits, items of knowledge, and patterns of conduct.

Indirect measurement.—In many of our physical measurements we apply the measuring instrument directly to the magnitude that we measure. For example, when measuring the length of a room we apply the yardstick or other instrument to the linear distance between two points. Sometimes we desire to measure something that is inaccessible or non-observable, and since a direct procedure cannot be employed, we measure something else which bears a known relation to the magnitude whose measurement we desire. For example, we measure temperature by measuring the height of a column of mercury or other liquid; we measure the height of a smoke-stack by measuring a horizontal distance and two angles.

In a sense all measurement of achievement is indirect since ability is known only through the performance that results from its functioning. But this is not the meaning given to the term "indirect" when applied to educational

measurements. In order to secure satisfactory measures of achievement it is necessary that the performances secured meet certain requirements. In the case of some controls of conduct it is difficult or impossible to secure performances that meet these requirements and hence it is necessary to substitute the measurement of related controls of conduct. For example, measures of the ability of students to answer fact questions have been used as measures of their ability to answer thought questions; measures of certain achievements are generally used as measures of capacity to achieve (general intelligence); measures of ability to spell words dictated separately are used as measures of ability to spell the words one uses in expressing his ideas in writing.

Prognostic measurement.—Although we are concerned primarily with the measurement of achievement, attention may be called to the measurement of general intelligence or capacity to learn. Such measurements are called “prognostic” since they constitute a prediction or forecast of what students may be expected to achieve under normal instructional conditions. Since a student’s capacity to learn tends to remain constant, measures of achievement have a prognostic value and may be used as a basis for predicting a student’s future success in similar subjects. However, the best prognostic measurements will usually be secured by employing instruments¹ designed to yield such information.

¹Instruments designed to be used for general prognosis are called “general intelligence tests.” In addition, a few tests have been devised for measuring the capacity to learn in a particular field such as a foreign language, mathematics, and the like. These are usually designated as “prognostic.” For a description of general intelligence tests and other prognostic tests see: MONROE, WALTER S., and DE VOSS, JAMES C.—*Educational Psychology*. Garden City, L. I.: Doubleday, Page and Company, or other texts on educational psychology or texts on educational measurements. See page 386.

The kinds of measures of achievement needed by teachers.—The preceding discussion of types of measures of achievement has probably caused the reader to ask: "What kinds of measures of achievement does a teacher need?" In answering this question it is desirable to separate the teacher's instructional needs from those that arise in determining the "grades" that are required by the administration of the school.

When they are to be used in the direction of learning, the measures of achievement should be as "direct" as possible, and usually diagnostic rather than general. When measurements are to be made the basis of grades, they should be general rather than diagnostic and may be derived from a sample, provided that the sample is representative of the total achievement. It is desirable that the measurements be direct, but occasional indirect measurement may be justified.

The justification of the requirement of diagnostic rather than general measures of achievement when they are to be used in the direction of learning should be apparent to one who has read Chapters V to X. Since a grade, as the term is usually used, represents a student's general or average standing, it is obvious that a general measure will be satisfactory and that it may be based on a sample of his achievement if it is representative. The requirement that diagnostic measures be "as direct as possible" and the desirability of direct measures when grades are to be determined are based on the relation of the measurement of achievement to educational objectives.

Relation of measurement of achievement to educational objectives.—In Chapter III, page 75, it was stated that a teacher's real objectives are implied in the learning exercises he assigns and in his tests of achievement. The meas-

uring of abilities gives them prominence and causes students to tend to make the ones measured their objectives. This principle applies to the informal measurement in the "hearing of lessons" and the evaluating of written work as well as to the use of written examinations or standardized tests.

Indirect measurement tends to change the objectives which students endeavor to attain. This results in a modification of the relation that originally existed between the abilities measured indirectly and the "other abilities" with the result that frequent indirect measurement is accompanied by a decrease in the dependability of the information secured. For example, assuming that under existing conditions the extent of the factual information possessed by the students in a history class is in close agreement with the magnitude of their other achievements in this field, the practice of measuring only factual achievements or even emphasizing these achievements in recitation and examinations will result in changing the existing relation so that the results of a test which calls only for the functioning of fixed associations (memorized facts and statements) will not constitute dependable indirect measures of other achievements in history.

Types of performances which may be accepted as dependable evidence of ability.—The significance of direct measurement will be more apparent if we note the types of performances that may be accepted as dependable evidence of the different types of ability. In general, the performances that may be considered dependable evidence of the possession of specific habits are those that are given in response to familiar exercises, that is, exercises on which the student has practiced. The functioning of specific habits is fluent. There is a minimum of reflection

and deliberation. Hence, if a teacher desires to learn about achievements consisting of specific habits, he should ask his students to do familiar exercises and note the fluency (rate and accuracy) with which they respond.

Knowledge is evidenced by the doing of a distinctly different type of exercise. Reflective thought is a name given to the process of using knowledge. It occurs when one encounters a difficulty, when he has a problem to solve. This means that exercises designed to measure knowledge must be "new" to the students,¹ or at least such that they will not remember the response to make. If the exercise is one for which a student possesses a ready-made response he has no problem to solve and the performance is not good evidence of his knowledge. In the preceding paragraph it was noted that the functioning of habits is characterized by fluency. The solving of problems is characterized by deliberation.

Evidence of ideals and attitudes is furnished not by a single performance but by the doing of a series of exercises which afford opportunity for variation from a general pattern of conduct. For example, the degree of a student's acquisition of the pattern of conduct² designated as an "ideal of neatness" is evidenced by his conduct on a variety of occasions rather than by a single performance.

Since the functioning of specific habits does not involve choice of judgment, the degree of conformity of such performances to a general pattern will have little significance. Hence, a teacher who desires to secure evidence in regard to the acquisition of general patterns of conduct by his students must formulate a series of exercises which require

¹In case this statement is not clear to the reader, he should refer to page 241.

²See page 314 f for an exposition of the meaning of "acquiring a general pattern of conduct."

the functioning of knowledge or which afford other types of opportunity for choice in performance. In general, the doing of these exercises must be distributed over a considerable period of time in order to secure evidence of the conformity of a student's conduct to a general pattern. This implies that general patterns of conduct cannot be measured by the giving of a single formal test or written examination.

Two general requirements of educational measurements.—The general requirements of educational measurements are usually summarized under two heads: validity and reliability. Although both of these terms may be new to the reader, the general meaning of the second is familiar. Accuracy may be used as a synonym for reliability. Validity represents a concept that is seldom introduced in physical measurements and hence one that may be new to most readers.¹

Validity or truthfulness of the label attached to a measure.—The question of validity does not arise in direct physical measurements. In many of the simple cases with which we are acquainted both the thing measured and the instrument used are observable and competent persons will not disagree in regard to the label which should be attached to the obtained measure. For example, if a person is observed using a yardstick to measure the length of a room and announces the result as "32 feet, 4 inches in length" no "competent" observer will say, "You are mistaken. What you really measured is the height of the room." In other words, the question of the appropriateness of the label "length" is not raised. Similarly, if a person steps on a pair of scales and announces his weight as 165

¹Some of the preceding discussion has related to validity, although the use of the term has been avoided.

pounds he will not be told by any "competent" person that he is mistaken and that what he has really measured is his height or lung capacity.

The reader should note in these illustrations that the question of the accuracy of the measurement is not raised. It might happen that because a defective yardstick was employed or because the instrument was used carelessly, the obtained result is incorrect, the true length of the room being "32 feet, 10 inches." In such a case one would say that the person measured the length of the room but did so inaccurately. This distinction between validity and accuracy or reliability is not usually made, but it appears helpful to consider the two requirements separately. This will be done here with the understanding that in some treatments of the subject "validity" has been defined so as to include "reliability" as one phase.

As an illustration of the validity of measurements of achievement, consider a teacher who gives a written examination and labels the resulting measures as "grades in history." A person who is acquainted with the nature of ability in history may examine the questions asked and perhaps the responses given by the students and then assert to the teacher, "You have not measured ability in history. What you have done is to measure the ability of your students to reproduce a few facts, several of which are relatively important. Of course you have measured something, but it is inappropriate to label the results 'measures of ability in history.'" The criticism in this illustration is in regard to validity. The question of accuracy is not raised. The measures secured by administering the examination would be valid if the right label were attached to them but they would not necessarily be accurate or reliable measures of the abilities defined by that label.

The problem of validity in educational measurements is due in part to the fact that we desire to obtain measures to fit previously formulated labels, such as "ability in English," "ability in algebra," "ability in shop work," and the like. The criterion of validity could be satisfied by modifying the labels so that they would be truthful names for the things measured, but such a procedure would not be satisfactory for the reason which we noted in our discussion of the relation of measurement of achievement to educational objectives.

The causes of invalidity in educational measurements.

—There are three conditions that tend to make educational measurements lacking in validity: (1) In indirect measurements, the assumption in regard to the relation between the abilities measured directly and those specified by the label may not be justified. (2) When a general measure is obtained from a sample, it may not be representative. (3) Abilities not included in the label may have been introduced into the obtained performance.

The different rubrics of controls of conduct are not measured with equal ease. It is relatively easy to secure performances which may be used as dependable evidence of specific habits. It is more difficult to secure evidence of knowledge, and the measurement of ideals, attitudes, and other general patterns involves even greater difficulties. The result of this condition is that teachers tend to confine their measurements to specific habits. When the achievements to be measured consist largely or wholly of specific habits, this tendency does not result in unsatisfactory measurements. However, when the achievements include knowledge and general patterns of conduct, as well as specific habits, it is obviously unsatisfactory to have the measurements restricted to the habituated out-

comes of learning. We need to secure measures of knowledge and in many cases of ideals and attitudes, and we are accustomed to use labels which indicate that we have done so, but frequently the actual measurements made are confined largely to specific habits and this tends to make the obtained measures lacking in validity.

The obtaining of general measures by means of sampling the achievements designated by the label attached to the result is another cause of invalidity. Sampling is used in making some physical measurements but precautions are taken to insure the representative character of the sample. For example, when testing a vat of liquid, it is stirred to secure homogeneity of composition before the sample is taken. A general measure of achievement based on a sample is valid only if the sample is representative. "Coaching" tends to invalidate the results of a test because the sample is not representative of the student's achievements.

In order to obtain an observable performance it is frequently necessary to require the functioning of abilities other than those whose measurement is desired. For example, the functioning of ability to read silently does not result in an observable performance, and when we desire to measure this ability, it is necessary to require the student to do something in addition to reading, such as answer questions or execute directions. Ability to spell and write is introduced in written examinations of the essay type although our purpose may be to measure ability in history, ability in physics, and the like.

How to secure a high degree of validity in educational measurements.—The principles to be observed in order to secure a high degree of validity in educational measurements have been implied in the preceding discussion. The

following statements tend to overlap, but they will serve to summarize the principles that a teacher should observe:

- I. Endeavor to secure the kinds of performances that are dependable evidence of the achievement to be measured.
- II. When the achievement to be measured includes knowledge and patterns of conduct, try to measure these outcomes of learning as well as specific habits.
- III. When employing sampling, try to secure performances that constitute a representative sample.
- IV. If additional abilities are introduced in order to secure an observable performance, disregard these as much as possible in describing the performance.

Determination of degree of validity of educational measurements.—The most direct method of determining the degree of validity of a given measure would be to compare it with a true measure of the ability specified by the label. It is seldom possible to employ this procedure in mental measurements because true measures are not available and therefore it is necessary to determine the degree of validity in other ways. The makers of standardized tests have employed certain methods¹ which involve statistical calculations but in general it is not possible for a high-school teacher to use these procedures in determining the degree of validity of the measurements he makes in the form of estimates or by means of written examinations. He must rely upon his judgment. In forming a judgment in regard to the degree of validity of a measure of achieve-

¹For a discussion of these methods see: MONROE, WALTER S.—*The Theory of Educational Measurements*. Boston: Houghton Mifflin Company, 1923, pp. 188-201.

ment a teacher should be guided by a clear understanding of the nature of that achievement and by sound principles of educational measurement.

Reliability or accuracy of measures.¹—Errors occur in the measurement of physical objects but they are so small that for many purposes they are commonly disregarded. For example, if one is using a tape line which he assumes to be a reasonably accurate instrument to measure the dimension of a lot, it probably will not occur to him to investigate the magnitude of the errors in the measurements he makes. A teacher measuring the height and weight of school children with instruments which he considers dependable, usually records the results without any thought of the magnitude of possible errors. When attention is given to errors a second measurement is made, perhaps using another instrument. If the two results agree reasonably closely, we accept one or the other of them as correct or take the average of the two. When highly precise results are desired, a number of independent measurements are made and the average taken as the most accurate.

Errors in mental measurements are much larger than those involved in measurements of physical objects. Even the most precise ones which we now make should not be considered as comparable in accuracy with measurements of length, weight, capacity, etc., which are made with reasonable care.

Two types of errors.—Before considering the causes of unreliability in educational measurements, it will be help-

¹This topic might have been introduced as a phase of validity because the presence of errors does affect the truthfulness of a measure, but the reader will find it easier to understand these two topics if he thinks of them as separate characteristics of educational measurements.

ful to note the fact that we encounter two types of errors, although they usually occur simultaneously and hence in combination. A *constant error*, as the name implies, is the same for all measures of a given group such as the grades of a class or the scores made on a standardized test by its members. A constant error may be positive or negative or it may be zero. Frequently a group of measurements involves a constant error of considerable magnitude. A *variable error* differs or varies for the several measurements in a given group. Approximately half of these errors are positive, the remainder being negative or exactly zero. A few are relatively large, but most of them cluster rather closely about zero which is their average.¹

Determination of the magnitude of errors in educational measurements.—The detection of either constant or variable errors in the measurement of physical objects is relatively easy. If one suspects the presence of an error, the measurement is repeated, perhaps using another instrument. Not only is it relatively easy to detect the presence of an error but it is not difficult to determine the magnitude of the error in a given measurement with a high degree of precision.

In the field of mental measurements it is not always easy to demonstrate the presence of errors, either constant or variable, and it is generally not possible to determine with any degree of precision their magnitude. A mental trait tends to be changed by the process of measurement. When making a second measurement of a given ability a different test may be used, but if the two instruments

¹For a complete consideration of these two types of errors see: MONROE, WALTER S.—“The Constant and Variable Errors of Educational Measurements.” Bureau of Educational Research Bulletin, No. 15. University of Illinois Bulletin, Vol. 21, No. 10. Urbana: University of Illinois, 1923, 30 pp.

are sufficiently similar to measure the same ability, the first testing will tend to make the score on the second test larger than it otherwise would be. Hence in general our knowledge of the errors in any given group of mental measurements is limited. It is seldom possible to secure definite information in regard to the magnitude of the errors in a particular measure. In most cases a teacher will not be able to go beyond general statements in regard to the probable limits of the magnitude of the constant and variable errors in the measurements of achievement which he makes.

For some of the available standardized tests a general index of the magnitude of variable errors which may be expected has been determined. By administering the test a second time to the same group of students two sets of measures of the same ability have been obtained. The coefficient of correlation calculated from these data is called the "coefficient of reliability," usually designated by the abbreviation "r." From this a second index, the "probable error of measurement," may be calculated.¹ This index is a statement of the probable limits of the magnitude of the variable errors in the scores obtained by administering the test.

It is not possible to calculate general indices of constant errors. One who is acquainted with the causes of such errors may be able to make some prediction in regard to their magnitude, and frequently it is possible to secure evidence on which one may base a fairly definite assertion in regard to the size of the constant error in a given group of measures. However, it is not possible to determine a

¹For an account of the method of calculating the coefficient of reliability and the probable error of measurement see: MONROE, WALTER S.—*Theory of Educational Measurements*. Boston: Houghton Mifflin Company, 1923, p. 202 f.

general index which may be associated with a particular measuring instrument.

Causes of errors in educational measurements.—The principal causes of errors in educational measurements are: (1) variability of the abilities being measured together with lack of complete control of testing conditions; (2) subjectivity in describing the obtained performances; and (3) failure to secure adequate functioning of the ability or group of abilities being measured.

The variability of human performances is a well-known fact. Some persons have a reputation of being "steady" or "consistent," but even these have their "off days." Other persons are known as "erratic," which designates the fact that they tend to be variable in their performances. The variations appear to be due in part to corresponding fluctuations in the ability functioning, but the conditions¹ under which the performances are given are also potent factors. Fluctuations in ability cannot be controlled by the teacher and he will find it very difficult and often impossible to control all factors of the testing conditions. He should, however, bear in mind that any lack of uniformity in testing conditions will tend to introduce errors in the measures which he obtains. If uniformity is lacking with respect to the several members of the class the errors will tend to be variable. If he wishes to make comparisons between his class and some other group and uniformity is lacking between the conditions which prevail for his students and the other group, a constant error will be introduced.

Except when using an objective test, the teacher must

¹In educational measurements these include directions given to students, the time allowed, the efforts students make, their attitude toward the test, their emotional status, their physical condition, their immediate environment, and so forth.

exercise judgment in measuring achievement. This condition is designated by the word "subjective." The effect of employing subjective methods in the description of performances has been given much attention by writers on educational measurements. The fact that in general different teachers attempt to assign widely varying marks to the same examination papers is so well known that it is unnecessary to present the evidence here. Although the facts collected in various investigations¹ must be admitted, some of the conclusions reached do not appear justified. There is a widespread conviction that opinions, especially those representing measures of achievement, usually involve such large errors that they are practically worthless. This conclusion is not justified. The errors in subjective educational measurements may be and frequently are relatively small.

In other fields, opinions, frequently called judgments,

¹One of the first investigations was by Starch and Elliott who found that the marks assigned to the same paper in plane geometry by 116 teachers ranged from 28 to 92 on the scale of 100 per cent. More striking evidence of the subjectivity of the marking of examination papers is cited by a more recent writer. One of a group of expert readers, assigned to the marking of a set of examination papers for a large college class in history, after scoring a few of them wrote out for his own convenience what he considered to be model answers to the questions. By some mischance this "model examination paper" fell into the hands of another expert reader who graded it as a paper written by a student. The mark which he assigned to it was below passing and according to the custom it was also rated by other expert readers with the result that the marks assigned to it by these readers varied from 40 to 90. There have been many investigations of the Starch-Elliott type and all of them have corroborated the findings of the first investigators.

For typical investigations see: STARCH, DANIEL, and ELLIOTT, E. C.—"Reliability of Grading High-School Work in Mathematics," *School Review*, 21: 254-59, April, 1913. MORTON, ROBERT L.—"The Examination Method of Licensing Teachers," *Educational Administration and Supervision*, 6:421, November, 1920. WOOD, BEN D.—"Measurement of College Work," *Educational Administration and Supervision*, 7:301-34, September, 1921. KELLY, F. J.—"Teachers' Marks," Teachers College, Columbia University, Contributions to Education, No. 66, New York: Bureau of Publications, 1914, pp. 51-84.

are respected. The judges of our courts render opinions relative to our social and moral activities. Men engaged in business have frequent occasions to make judgments which are accepted as a basis for action. However, it should be noted that the judge has been prepared for rendering opinions by a long course of legal training. The successful banker is an "expert" in finance. One reason, probably the most potent one, why we respect their opinions is our realization that they have been trained for such work. This suggests that our lack of respect for opinions in regard to educational matters is due to the "inexpertness" of those rendering them. High-school teachers have seldom received much explicit preparation for estimating achievement or for devising and using written examinations. It is not unreasonable to predict that if they were given the right kind of training for this phase of teaching they would be able to make judgments that would compare favorably in accuracy with the measurements obtained by using objective methods.¹

The third cause of errors in educational measurements requires little comment. Since a student's ability can be known to the teacher only through his performances, it is obvious that he must be given an opportunity to show what he can do. He does not have this opportunity when the exercises he is asked to do are so easy that he does not find it necessary to utilize all of his ability. Neither does the student have an adequate opportunity to demonstrate his ability when the exercises are so difficult that he can do very few or none of them. This is especially true when the teacher attempts to secure only a small sample of the achievement.

¹For some evidence in support of this statement see: MONROE, WALTER S., DE VOSS, JAMES C., and KELLY, F. J.—*Educational Tests and Measurements, Revised and Enlarged*. Boston: Houghton Mifflin Company, 1924, p. 468 f.

How to reduce the errors in educational measurements.

—The preceding discussion has suggested several ways to reduce the constant and variable errors in educational measurements and additional consideration will be given to this topic in Chapter XVI, but certain general principles may be stated here.

- I. Testing conditions should be uniform for all members of the group.¹
- II. Teachers should be trained for making the judgments required in educational measurements.
- III. All students should be given an adequate opportunity to demonstrate their ability.

Types of measurement procedures.—Although it is difficult to define exact lines of demarcation, four distinct types of procedures are employed in measuring school achievements: (1) informal estimating of performances, both oral and written; (2) written examinations of the essay type; (3) written examinations consisting of exercises constructed so that the marking of the papers is highly objective, frequently called “new examinations”; (4) standardized tests which are distinguished from “new examinations” by the norms or standards which have been determined for the interpretation of the measures obtained.

The first two of these measurement procedures are familiar to all who have attended high school and college. The “new examination” has come into prominence as a means of measuring school achievement since 1920. Its essential characteristic is that the exercises are constructed

¹This principle is due to the fact that we usually desire to compare the measurements of achievement. If each measurement were used only independently and the testing conditions under which it was made were kept in mind, this principle would be unnecessary.

so that only one response is correct and hence the scoring is objective rather than subjective. Usually very little writing is required of the student. Some such exercises have long been used by teachers. For example, in history, students have been asked to give the name of a person or the date of an event. In addition to such simple recall questions several other types are being used—completion exercises, in which the student is asked to supply a missing word or phrase; true-false exercises, in which the student is asked to declare whether a given statement is true or false; multiple-choice exercises, in which the student is presented with several possible answers and is asked to choose the correct one or the best one; matching exercises in which a student is given two sets of facts and asked to match them. For example, in history he may be given a list of men and a list of events and be asked to connect the men with the proper events.¹

The exercises of standardized tests are similar to those used in the “new examinations,” but usually they have been selected with considerable care and their fitness for measuring achievement determined by trial. In addition, norms or standards have been determined so that one using such a test may know in advance what scores students who have achieved satisfactorily should make. Usually standardized tests are printed in convenient form and are accompanied by administrative aids which facilitate their use. A standardized test may be thought of as a ready-made measuring instrument, that is, one which a teacher may purchase for use. Examinations of the essay type, as well as “new examinations,” must be constructed by the teacher.

¹These types of test exercises are described more fully, and are illustrated in Chapter XVI.

The uses of the different measurement procedures.—Each of the four procedures has certain merits and may properly be employed by teachers of most high-school subjects but none of them is perfect. The millennium in educational measurements is not to be attained by avoiding the first two procedures and restricting teachers to “new examinations” and standardized tests. The teachers of most high-school subjects will find it advisable to employ informal estimating and written examinations of the essay type. Hence it is important that they should understand clearly the merits and limitations of each of these measurement procedures.

Usefulness of standardized tests limited in the high school.—Standardized tests have the merit of possessing norms for interpreting the measures secured by using them. Most of these measuring instruments are highly objective and convenient to administer. On the other hand, the measures yielded by them usually involve errors, both constant and variable. In some cases these errors are relatively small but frequently they are so large that disregarding them will result in misleading conclusions about the magnitude and quality of achievement. Furthermore, standardized tests may be and frequently are lacking in validity. A test measures some ability or group of abilities, but the label attached to the scores is not always a correct designation of the thing measured. The fact that a test is called “standardized” or is described as “scientific” does not justify a teacher in assuming that it approximates perfection as a measuring instrument.

The norms established for a standardized test imply the acceptance of certain educational objectives which are uniform for all teachers in the field covered by the test. This appears to be desirable in such subjects as handwrit-

ing, arithmetic, typewriting, and stenography, but it is not clear that uniform objectives are desirable in all high-school subjects. For example, it seems likely that two teachers of European history might be equally efficient in realizing the ultimate objectives of the course but vary widely in the emphasis which they place upon details. Indeed, it is conceivable that they might exhibit considerable lack of agreement in their detailed objectives. It also appears that it is not undesirable for a teacher of a "content" subject to vary the details of the course somewhat from year to year. A high degree of uniformity in the details of such subjects probably tends to mechanize the instruction and hence to defeat some of the purpose they are to fulfill.

It has been found that when a given standardized test is used, the particular outcomes which it measures tend to be given special attention by both teachers and students. As a result other objectives in the same subject-matter field are likely to be neglected. The acquiring of information represents one important objective in many high-school subjects, but in practically all of these subjects the instruction should also engender other types of outcomes. If the systematic use of standardized tests results in undue emphasis upon memorizing facts and the neglect of other objectives, the total effect will be harmful. Hence, in using such standardized tests as are available the teacher should make certain that other outcomes receive appropriate emphasis.

The possibility of diagnosing high-school students with respect to their achievements by means of standardized tests is much less than in the elementary school. A diagnosis cannot be made until the students have had some opportunity to achieve. They must have received some

instruction on the topic before the diagnosis is made. In the elementary school the students pursue a number of subjects over a period of several years. For example, they study silent reading in all grades. By continued drill they are trained to be fluent readers. Much the same situation exists in spelling, handwriting, and arithmetic. In the field of each of these subjects there is abundant opportunity for diagnosis with respect to achievement before the period of learning is completed.

In the high school, however, the situation is materially different. As a rule, when a topic has been studied, the student does not return to it except incidentally or in the course of review. There are certain exceptions such as the operations of algebra, and reading of a foreign language in which the engendering of skills extends over several months or even longer. However, for the most part high-school students engage in the study of topics on which they do not receive continued training. Hence, a diagnosis with respect to achievement is, in general, impossible until instruction on the topic has been practically completed. Then a diagnosis has only a limited usefulness. Therefore, it should be clear that standardized tests designed to be used as diagnosing instruments will not be as useful in the high school as in the elementary school unless our general plan of instruction is modified so that the learning of a given topic will extend over a longer period of time.

The "new examination" useful for measuring information.—"New examinations" have the merit of being highly objective, but the attainment of this quality may result in the introduction of serious limitations. The exercises are limited to those which call for responses that may be classified as either right or wrong. The "new examination" may be used to measure specific habits, including memo-

rized facts, but it does not appear that it can be used to measure knowledge, ideals, or attitudes directly and it is doubtful if indirect measurement will be satisfactory. Since questions which ask the student to define, explain, discuss, give reasons why, compare, and so forth, are excluded, an extensive use of this type of measuring instrument would undoubtedly tend to emphasize the memorization of facts as an immediate objective.

The "new examination" has many enthusiastic supporters. A number of writers have recommended it to teachers without reservation.¹ On the other hand, a recent writer after making an intensive study of the "new examination" in the field of history announces the following conclusion: "Given tests² of equal length, as measured by time spent in testing, and prepared by teachers with some training in the matter of test construction, one type of test yielded practically as good results as another for measuring achievement in history in the senior high school. With one or two exceptions, this was true whether the achievement measured was general achievement for the course, ability to think with the materials of the course, or information."³ In reporting another investigation it is suggested as a tentative conclusion that "the true-false test is not universally a highly valid method of examination."⁴

¹WOOD, BEN D.—*Measurement in Higher Education*. New York: World Book Company, 1923, 337 pp.; and RUCH, G. M.—*The Improvement of the Written Examination*. New York: Scott, Foresman and Company, 1924, 193 pp.

²The tests compared are the "new examination" and the written examination of the essay type. The types of "new examinations" used were true-false, multiple-choice, completion, and arranging events in a specified order.

³BRINKLEY, STERLING G.—"New Type Examinations in the High School." Teachers College, Columbia University, Contributions to Education, No. 161. New York: Bureau of Publications, 1924, p. 58.

⁴PATTERSON, DONALD G., and LANGLEY, T. A.—"Empirical Data on the Scoring of True-False Tests," *The Journal of Applied Psychology*, 9:347, December, 1925.

One advantage urged for the new examinations is the saving of time. It is, of course, obvious that since students are asked to do relatively little writing only a short period will be required for doing a new examination of from forty to fifty exercises. Since the marking of the papers is objective this can be done very rapidly. However, one must also consider the time required to formulate the exercises. The investigator just quoted reports that "for tests of equal length and involving equal numbers of pupils the new-type examination took in preparation and scoring two and one-half times as long as the old-type examination."¹

Written examinations of the essay type have merits.—The faults of written examinations of the essay type have been emphasized in recent years and some persons have arrived at the conclusion that they have no merits. (See footnote, page 490.) Although certain faults must be admitted, one must not forget that the essay type of examination possesses certain desirable qualities. Since we have no means of securing perfectly valid and accurate measures of achievement, the question at issue concerns the relative rather than the absolute merits of the measurements secured by means of written examinations. Furthermore, one must bear in mind that facts may be misinterpreted. The results of a recent investigation carried out under the direction of the writer² indicate that examination grades are more accurate measures of achievement than they have commonly been supposed to be by those who were acquainted with the results of investigations of the Starch-Elliott type. The writer's inquiry into this matter has con-

¹BRINKLEY, *ibid.*, p. 59.

²MONROE, WALTER S., and SOUDERS, LLOYD B.—"The Present Status of Written Examinations and Suggestions for Their Improvement." Bureau of Educational Research Bulletin No. 17. University of Illinois Bulletin, Vol. 21, No. 13. Urbana: University of Illinois, 1923, 77 pp.

vinced him that many teachers are securing by means of the examinations they give to their students, measures of achievement which are equal, if not superior, to the scores yielded by some standardized tests.

Informal estimating a necessary measurement procedure.—Informal estimating is a highly useful measurement procedure, especially when measurement is required in the directing of learning activities. Its informal quality makes it easily adaptable to many situations and occasions in which a standardized test or even a written examination, either “new” or essay, would be unsatisfactory.

Informal estimating can be applied to all types of ability, but its greatest usefulness is a means of measuring patterns of conduct because the other measurement procedures cannot be used to any considerable extent. Informal estimating is also needed in the measurement of knowledge since there are occasions when it is not convenient to use a more formal procedure.

Summary of uses of the different measurement procedures.—No one of the four measurement procedures is perfect. All have their faults but each also possesses certain merits. Most high-school teachers will find it profitable to make some use of all of them. A teacher should never give a standardized test in order to do the fashionable thing. The use of the “new examination” should not be exploited.

With the exception of standardized tests which are ready-made measuring instruments the merits of a measuring procedure depend largely upon the teacher. One who is expert in evaluating oral performances of students is likely to secure more valid and more accurate measures of achievement than some teachers who employ elaborate written examinations. Although standardized tests in general yield more accurate measures than are secured by

means of written examinations, some teachers have devised written examinations of the essay type that yielded measures of achievement which were more accurate than the scores yielded by many of our standardized tests.

Informal estimating is used almost exclusively for measuring general patterns of conduct. This procedure is also useful for measuring achievement in laboratory and shop work.

Written examinations of the essay type are especially useful for measuring knowledge, the ability to solve problems, meet new situations.

The "new examination" is useful for measuring information. It can be used to measure knowledge indirectly.

A standardized test should be used when norms for comparison are desired, provided that the test will yield valid and reliable measures.

LEARNING EXERCISES FOR THE READER

1. Compile a list of the technical words relating to educational measurements which have been used in this chapter.

2. Prepare a brief of the chapter. (See Chapter IX for the meaning of a brief.)

3. Will an objective test necessarily yield reliable measures? Will it yield valid measures? Give your reasons.

4. What is indirect measurement? Explain how indirect measurement may produce a change in the immediate objectives of students.

5. Distinguish between a learning exercise and a test exercise.

6. Prepare a written summary of the discussion of validity and reliability.

7. Why is the usefulness of standardized tests limited in the high school?

CHAPTER XVI

THE IMPROVEMENT OF MEASUREMENT PROCEDURES

The questions to be answered.—The major portion of this chapter will be devoted to a consideration of the following questions:

1. How may a teacher make the “best” estimates of achievement?
2. How may a teacher arrive at the “best” grades when using examinations of the essay type?
3. What principles should a teacher observe in constructing and administering a “new examination”?
4. What criteria should guide one in selecting and using a standardized test?

After these four major topics have been considered, attention will be given to several minor problems relating to the measurement of achievement.

Measures of achievement distinguished from grades.—Before considering these questions it will be helpful to note that measures of achievement and grades are not the same thing. This distinction is apparent when a standardized test or a “new examination” is used because the resulting measures are expressed first as scores which must be “translated” into grades if they are desired. When the measurement is made by informal estimating or the use of a written examination of the essay type, the process of

translating the score into the corresponding grade tends to be eliminated because only the grade is expressed.

A "score" is simply a quantitative description of a performance observed or recorded on an examination paper. For example, a student's performance may be described by saying that he answered 55 per cent of the questions correctly. In this case 55 is his "score." If a certain number of points or credits had been given for each question his score might be 129, or 91, or 22. A "grade" is an interpretation of this description with reference to a norm. A "grade" indirectly describes a student's performance, but it tells also whether the performance is considered as above or below passing.

It is customary to describe examination papers in terms of the per cent of questions answered correctly. For example, if an examination includes ten questions and a student answers seven of them correctly and an eighth one partially right, he is given a score of 75 per cent, which is interpreted to mean that in the judgment of the examiner he has answered the questions 75 per cent correctly. School marks or "grades" are also frequently expressed in terms of per cents. Sometimes they are expressed in terms of letters or other symbols, but frequently these also are defined in terms of per cents. For example, the grade of "A" may be defined as being between 95 per cent and 100 per cent. Since both "scores" and "grades" are frequently expressed in terms of per cents, it is only natural that the two have been confused and that "scores" have been used as "grades."

A good illustration of the distinction between these two terms came to the writer recently. An examination in mathematics was given to nearly one thousand freshmen in one of our large universities and the papers marked in

terms of per cent of exercises done correctly. One student made a score of 100. The lowest score was 12. The average score was approximately 55. However, in interpreting the scores of this group of students it would be difficult or impossible to justify translating scores of 70 into grades of 70 or its equivalent D, and scores of 69 and less into grades considered failures. However, this is what is done when scores are used as grades. In this illustration it is likely that a score in the neighborhood of 40 should be taken as the passing mark. If the "grades" are to be reported in terms of per cents, a "score" of 40 should be translated into a "grade" of 70 or whatever passing mark has been adopted by the institution.

In studying the following discussion of the improvement of measurement procedures the reader should keep this distinction in mind. In general, we shall be concerned with scores rather than grades. Later a procedure for translating scores into grades will be explained. (See page 524.)

I. Improving informal estimates of achievements.—Informal estimates of achievement include all measures not obtained by the use of a formal test or examination which in practically all cases is written. The means of increasing the validity and accuracy of estimates may be discussed under two headings: (1) significant characteristics of performances, and (2) procedure to be followed in making estimates.

(1) *Significant characteristics of performances.*—The characteristics of a performance that are significant depend in part upon what one is attempting to measure. For example, if a teacher is measuring specific habits, both rate and accuracy of performance are usually significant. When measuring ability to solve problems, methods of work may be more significant than the accuracy of the answer. If a

general pattern of conduct, such as neatness, is being evaluated, the consistency of a series of performances with respect to this pattern is significant.

A teacher should avoid being influenced by personal traits of a student which have little or no relation to the achievement being measured. A pleasing disposition, a clear and well-modulated speaking voice, neatness in dress, courteous behavior, and the like are desirable traits but they are not a part of the achievement designated as "ability in algebra," "ability in Latin," and the like, and therefore should not be allowed to influence estimates of such achievements. In general, a good speaking vocabulary and fluent expression should not be given much weight. Neither is it wise to "give credit for trying." When a teacher is influenced by a student's personal traits or by other characteristics that do not constitute a phase of the achievement being measured, the resulting estimates tend to be lacking in validity.

Throughout the preceding chapters we have distinguished between the activity of learning and the outcomes or results of this process. Engaging in a learning activity is merely a means to an end, the acquiring of certain controls of conduct by the student. The phrase "measurement of achievement" implies that the outcomes of learning are to be measured rather than the activity of learning. In other words, the teacher should attempt to evaluate quantitatively what a student has achieved, his ability to do.

This point of view is opposed to giving credit for amount of work done in response to assignments, effort, interest, and so forth. It is true that frequently the amount of work done and the quality of the learning performances are indicative of a student's achievements. However, the excep-

tions are so numerous that, in general, measures of the amount and quality of work done should not be used as measures of achievement. The lack of agreement between the doing of learning exercises and achievement is illustrated by the boy who was required to write "I have gone" one hundred times and then left a note for his teacher saying, "I have went home." It is important that a teacher avoid developing the attitude that the doing of exercises is the objective of education. He should try to go beyond the observable learning performance and evaluate its effect upon the student.¹

(2) *Procedure to be followed in making estimates.*—The accuracy of the estimates a teacher makes will be increased by formulating standards of achievement in as definite terms as possible. For example, in algebra a teacher may set down fairly objective standards for the grades of A, B, C, and so forth, by adopting certain specifications concerning the rate of doing exercises and the accuracy of the work. (See page 67.) In such subjects as history and literature it is more difficult to set up definite formulations of standards, but a teacher who is willing to study the problem of estimating achievements of students will be able to increase the accuracy of the estimates he makes.

Just prior to the entry of the United States into the World War, Scott originated a device which is known as the "man-to-man comparison scale." During the war this device was used extensively as a means of rating. More recently it has been applied to the measurement of merit in other fields. The essential feature of the scale is the selection of five real persons to represent five degrees of merit, ranging from the best to the poorest. For example,

¹See Chapter III, especially pages 75-82.

in making such a scale for the measurement of teaching efficiency one is directed to select "the best teacher you have ever known" for the highest step of the scale. For the lowest step of the scale "the poorest teacher you have ever known" is to be selected. Other teachers are chosen to represent "average," "better than average," and "poorer than average."

Such a scale could be formed for measuring achievement in such subjects as history and literature in which ideals and attitudes are prominent as outcomes. For the highest step of the scale the teacher would select "the best student he had ever known"; for the lowest step he would select "the poorest student he had ever known." An experienced teacher would possess a distinct advantage in forming such a scale, but a beginning teacher would have recourse to his knowledge of students he had known as classmates in high school or whom he had observed during his period of training. As he became acquainted with other students his scales could be modified when he found more appropriate representatives of the various degrees of achievement.

Such a device is too elaborate and cumbersome to use in much of the rating of achievement a teacher is called upon to do, but it offers a valuable suggestion. As a teacher becomes acquainted with the achievements of a number of students he will be able to build up a crude man-to-man comparison scale which will enable him to increase the accuracy of his estimates of achievements. Even if he does not use it formally, the formulation of such a scale will undoubtedly function in increasing the accuracy and validity of his estimates. An explicit use of the scale would be especially helpful in such subjects as history and literature.

II. Improvement of written examinations of the essay type.—The most important end to be sought in improving written examinations of the essay type is to secure measures of achievement which are as valid and accurate as possible, but the practical considerations should not be forgotten. The improvement procedures may be grouped under three heads: (1) devising and selecting test exercises, (2) administering the examination, and (3) scoring the examination papers.

(1) *Devising and selecting test exercises.*—The designation of the examination as the “essay type” indicates that the exercises consist of “thought questions” (see page 240), or problems and requests for reproducing in substance, descriptions, expositions, and arguments. Requests for specific facts and verbatim statements belong in a “new examination” rather than in one of the essay type.

When a teacher’s purpose is to measure the possession of knowledge plus the ability to use it, the exercise must be one requiring reflective thinking. An exercise which a student has done as a learning exercise or has answered correctly on a previous examination does not require reflective thinking if he remembers the answer. Even when he is able to recall only a portion of the answer, the performance is poor evidence of his ability to use knowledge. Hence, unless the teacher’s purpose is to measure ability to reproduce descriptions, expositions, and arguments, the exercises should be “new,” that is, ones that the students have not done before or at least ones for which it is unlikely that they will be able to recall the response requested.

A second principle is that the test exercises be consistent with accepted educational objectives. A teacher is not equipped to prepare a list of examination questions until

he has a clear understanding of the immediate objectives of the course or section of the course for which achievement is to be measured. It may be "interesting" to ask students to respond to puzzles or other exercises which are not in agreement with accepted educational objectives, but it is seldom worth while and is to be condemned.

The test exercises should be stated in clear and definite terms so that no competent student will encounter difficulty in understanding them. "Catch" questions should be avoided and the students should be given explicit directions concerning the types of responses expected. When attempting to measure knowledge the exercises should not be "easy" but should require the students to exert themselves. On the other hand, the exercises should not be so difficult that a majority of the class will fail. It is advisable to make the examination long enough so that practically no students will finish before the end of the period.

(2) *Administering the examination.*—Makers of standardized tests have given much attention to formulating detailed directions for administering them and have emphasized the importance of controlling testing conditions. Since a written examination of the essay type is not standardized, it is not as important that the teacher follow a prescribed procedure in administering it. However, there are certain general rules that he should observe.

So far as possible the physical environment should be adjusted so that it will be conducive to the mental activity which the examination asks for. If examination booklets or paper are to be distributed, the teacher should ask two or three students to do it. The discipline of the room should not be relaxed. In the case of final examinations or other previously announced tests, the students should be required to be prepared with well-sharpened pencils or with

pens. When facilities are available, it is advisable to have the questions mimeographed or printed so that each student may have a copy. If the questions are written on the blackboard, the teacher should endeavor to have the students seated so that none will experience difficulty in reading them. It is advisable for the teacher to read the questions aloud, even when each student has a copy. The students may be permitted to ask about statements that appear obscure, but the teacher should reserve the right to refuse to answer any question he feels is not appropriate.

The teacher should inform the students concerning such matters as the amount of time they will have for writing the examination, the order in which it is desired that the questions be answered, the importance of attempting all questions, elaborateness of responses desired, the relative importance of the exercises, the characteristics upon which the scoring of the papers will be based, and the like.

(3) *Scoring examination papers.*—The reader should bear in mind that a distinction is made between “scores” and “grades.” This distinction is the basis of much of the possible increase in the reliability of measurements made by means of written examinations of the essay type. The following discussion relates only to the improvement of scoring examination papers of the essay type. The translation of scores into grades will be considered later. (See page 524 f.)

The scoring or evaluation of examination papers of the essay type requires the exercise of judgment and the teacher should prepare himself to make “expert” judgments. (See page 490.) The first step is to determine the essential characteristics of satisfactory responses to the exercises of the examination. In the case of mathematical problems that ask for a definite quantitative answer this is

relatively easy, but thought questions asking the student to compare, explain, discuss, and the like do not lead to definite answers. Therefore, it is not possible to specify what answers are to be considered "wrong" and what ones "right." There are, however, certain general rules that a teacher should follow.

Most school subjects have a considerable technical vocabulary of their own and the use of technical words and phrases is a very significant index of achievement in that field. The misuse of a technical term or even failure to use a term when it would be effective in expressing the ideas should be considered evidence of unsatisfactory achievement. Closely connected with the usage of technical terms are the qualities of clearness, definiteness of statement, organization, unity, and coherence. An "essay" response should be judged with respect to its consistency with the question asked. The presence of irrelevant ideas is an indication of failure to understand and think clearly.

We noted in our consideration of teachers' estimates that such factors as effort, apparent interest in the subject, and time spent should not influence a teacher in estimating a student's achievement. In marking examination papers a teacher should disregard such characteristics as English, spelling, and handwriting.¹ If it is desired to give attention to these matters, a separate grade may be assigned or in cases of extreme deficiency in these qualities the teacher may refuse to assign any grade to the paper. The important thing is that achievement in English, spelling, and handwriting should not be mixed with achievement in geometry, history, physics, and so forth. To do so will tend to lessen the validity of examination grades. In general, the teacher

¹This statement is not intended to apply to examination papers in courses in English.

should disregard all characteristics other than those that are indicative of the particular achievements that it is desired to measure. Failure to observe this principle will tend to cause the resulting grades to be lacking in validity.

By exercising care in formulating the exercises, one may reduce the subjectivity of the marking of examination papers of the essay type but a much greater reduction can be accomplished by adopting definite rules for marking the papers. These rules should include specifications in regard to the credit for correct principle, partial credit for exercises partly right or partly completed, misuse or failure to use technical terms, and the like. For guidance in marking papers a teacher should write out, at least in abbreviated form, the correct answers to the questions. Usually examination papers should be scored in terms of points rather than "grades." The teacher should determine the number of points to be given for a satisfactory response to each question. The basis of this determination should be in part the difficulty and magnitude of the question, but its social importance should also be considered. It is not necessary that the total of the possible points be 100.

Greater accuracy will usually be attained by scoring one question on all of the examination papers instead of completing each paper as it is taken up. Sometimes a paper may be scored as a whole instead of "marking" each question. When this is done the papers should be sorted into piles as they are read. After all have been read, the papers in each pile should be read a second time, at least rapidly, in order to detect errors or cases of poor judgment.

Summary of suggestions for the improvement of written examinations.—1. If it is desired to measure knowledge, thought questions should be asked and they should be "new."

2. The content of an examination should agree as closely as possible with recognized educational objectives. Catch questions or questions relating to unimportant details should not be included.

3. The questions asked should be definite and stated so that all students will interpret them alike.

4. The examination should be sufficiently difficult so that few students will make perfect scores.¹ Usually it should be long enough so that every member of the class will be kept busy for the entire period. It is better to make the examination too long than to have it too short. Appropriate adjustments for failure to complete all of the questions can be made in translating scores into school marks.

5. Unless the students have a definite understanding of the methods of work which are to be followed, the teacher should give explicit directions concerning such matters as the order in which the questions should be answered, the desired arrangement of the work, and any other items in which there is an opportunity for students to adopt different procedures. In questions asking for a discussion or explanation, the teacher should indicate the completeness of the discussion or the degree of elaborateness expected in the answer.

6. When necessary equipment is available, the questions should be mimeographed or typewritten so that each student will have a copy on his desk. In case they are written on the board the teacher should make certain that all students are able to read them. In either case it is well for the teacher to read the questions aloud to the class and afford opportunity for inquiries concerning their meaning.

¹This rule does not apply when the purpose of the examination is to determine the degree of perfection of performance on certain exercises.

7. Before beginning to mark a set of examination papers it is advisable for a teacher to write out the answers to the questions. In mathematics and other cases, when the questions are such that a definite answer is required and only one can be accepted as correct, the need for this rule is not as great as in such subjects as geography, history, literature, and certain phases of science. However, the preparation of a list of correct answers will usually mean a saving of time even in mathematics.

8. Except in courses in English a student's grade should not be intentionally lowered for errors in spelling or for poor handwriting. As a rule the grade should not be lowered because of poor English, unless the quality of the English is evidence of the lack of clear ideas. Rules covering these points, as well as others concerning which teachers might differ, should be formulated by the principal of a school in conference with his teachers or at least by a committee of them. The rules thus formulated should be carefully followed by all of the teachers.

9. In marking examination papers more accurate results will be secured if the answers to one question are marked on all the papers before those for another question are taken up. When it is desired to mark all of the questions on one paper before taking up another, the "sorting method" should be used. According to this procedure the papers as they are read are sorted into piles, the best ones being placed in the first pile, the next best in the second pile, etc. Five piles will, in most cases, prove sufficient. After all the papers have been distributed they should be reread, one pile at a time, and compared with each other. If these papers do not possess approximately the same value, changes in the sorting should be made. Grades may then be assigned to the papers in accordance with their

distribution.¹ This sorting method is particularly helpful in such subjects as history, literature, and certain phases of science. It will not be of much assistance in mathematics or in other cases when the examination consists of questions which permit of one and only one correct answer.

10. The distinction between "scores" and "grades" should be kept in mind. It is advisable to mark the papers in terms of scores. In doing this an appropriate number of points should be determined for each question. Although any weighting of questions by a teacher will be subjective, it is probably desirable to weight questions when the differences in value are judged to be large. The weighting, however, should be upon the basis of social importance rather than upon mere difficulty. It is not necessary that the total of the points be 100. The point scores assigned to the examination papers should be translated into school marks. In doing this the use of a standard distribution will be found helpful, and will operate also to decrease the magnitude of the constant errors.

III. Constructing and administering a "new examination."²—The name "new examination" is given to lists of exercises that call for responses whose scoring is highly objective. These exercises include: (1) "simple recall questions" which are more commonly called "fact questions" answerable by name, a date, word, and the like; (2) true-false exercises; (3) completion exercises; (4) multiple-choice exercises in which the student chooses one from

¹The use of the "sorting method" eliminates the necessity of marking the papers in terms of "scores" and then translating them into "grades." The sorting provides a basis for assigning grades directly.

²For a more elaborate discussion of this topic and illustrative lists of exercises see: RUCH, G. M.—*The Improvement of the Written Examination*. Chicago: Scott, Foresman and Company, 1924, pp. 65-105. WOOD, BEN D.—*Measurement in Higher Education*. Yonkers: World Book Company, 1923, pp. 215-92.

several given responses. "Matching exercises" (see page 520), "best-answer exercises," and "identification exercises" are sometimes listed but they are essentially only varieties of the "multiple-choice" type.¹

Teachers who are inexperienced in constructing "new examinations" will find the formulation of a sufficient number of exercises difficult. An essential requirement is that the response asked for be of such a nature that the scoring will be highly objective. This usually will mean that the student does little or no writing. It is also important that the exercises be in agreement with our educational objectives. If the performances which students give in doing them do not constitute dependable evidence of the degree to which they have achieved certain objectives, the measures yielded by "new examinations" will be lacking in validity. The construction of three widely used types of exercises will be considered separately.²

(1) *Directions for constructing true-false examinations.*—In the true-false type of exercise the student merely indicates whether a given statement is true or false. Instead of asking the question, "Why did the Puritans come to America in the seventeenth century?" we may ask whether the following statement is true or false: "The Puritans came to America in the seventeenth century seeking wealth." The student may give his answer to this exercise by writing a plus sign after the statement if he considers

¹There are several other types of objective exercises and numerous variations of the types mentioned here. Odell has described thirty-seven varieties. ODELL, CHARLES W.—"Objective Measurement of Information,"—Bureau of Educational Research Circular, No. 44. University of Illinois Bulletin Vol. 23, No. 36, Urbana: University of Illinois, 1926, 27 pp.

²For a more elaborate discussion of this topic see: WEIDEMANN, C. C.—"How to Construct the True-false Examination," Teachers College, Columbia University, Contributions to Education, No. 225. New York: Bureau of Publications, 1926, 118 pp.

it true and a minus sign if he considers it false. In case the statement is dictated to him he may write after the number of the exercise the word "true" or "false" or the appropriate sign.¹

In construction a set of true-false exercises the teacher should prepare a list of statements covering in some detail the portion of the subject on which the students are to be examined. In doing this it is advisable to formulate statements which are true rather than false. After a list has been compiled changes should be made in the wording so that approximately half of them will be false. The arrangement should be such that there is no regular sequence between those which are true and those which are false. The truthfulness or falseness of a statement should not be too obvious or it will be worthless for testing. It is advisable to formulate a larger number of exercises than are to be used so that those which appear to be least suitable for testing purposes may be eliminated. In order to secure measures whose reliability is superior to that of the measures yielded by the essay type of examination a true-false examination should consist of not less than fifty statements. An examination of one hundred exercises can be given in the time usually devoted to an ordinary examination.

The examination should be mimeographed or printed so that each student can be given a copy. He may give his answers in the margins of the sheets, or if it is desired to use the same set of papers with another group of students, a separate sheet on which there are numbered blanks may be used. In this case the student will be asked to record in the blanks his answers to the corresponding exercises. A less desirable plan, which may be followed when it is not

¹See page 442 for other illustrations of true-false exercises.

possible to secure mimeographed copies of the examination, is to read the statements to the students and have them record their answers in numbered blanks. The disadvantage of this plan is that the students do not have a satisfactory opportunity to study the statements. Also the class may give some indication of the answer to an exercise if a statement appeals to them as being ridiculous.

The students should be given specific directions in regard to answering exercises about which they are uncertain. One writer has suggested that the students be instructed to guess concerning the truth or falsity of the statement. Another writer suggests that students be instructed as follows: "First, go through the list quickly and mark all that you know for certain, then go back and study the harder ones. Do not guess; the chances are against you on guessing. Don't endanger your score by gambling on those questions about which you know nothing." This second procedure is probably the better.

Since only two answers are possible, it is obvious that a student who guesses may give a correct response as the result of chance. In order to take this possibility into account, the number of exercises answered correctly minus the number answered incorrectly is usually taken as a student's score on a true-false examination. Exercises not attempted are not counted. This rule has been criticized on theoretical grounds and investigation has indicated that slightly more reliable scores are obtained by using the "number of exercises right" as a student's score.¹ This conclusion appears to be independent of the instructions in regard to guessing. In another investigation based on true-

¹PATTERSON, DONALD G, and LANGLIE, T. A.—"Empirical Data on the Scoring of True-false tests." *The Journal of Applied Psychology*, 9:339-48, December, 1925.

false tests in certain college subjects when the students were instructed, "Do not guess," the "number of exercises right" constituted a slightly more reliable score than the "number right minus the number wrong." A study of the validity of the two methods of scoring tended to favor the second.¹

(2) *Directions for constructing multiple-choice exercise.*²—The essential requirement of a multiple-choice exercise is that the student be given several plausible answers to a question and asked to select the correct one, or a sentence may be given which lacks a word or phrase and the student asked to select the appropriate word or phrase from a given list. Several illustrations are given. See also page 441f.

The statement $2x + 5 = 29$ is called an
(identity—equation.)

If one number is exactly divisible by another, the first is called a of the second.
(divisor—multiple.)

A food rich in vitamins is
(macaroni sugar lean meat leafy vegetables)

The best method of cooking dried fruits is to
..soak fruit, change water, and cook at boiling temperature.
..soak fruit and change water several times during cooking.
..wash fruit and cook at boiling temperature.
..wash fruit, soak several hours, and cook slowly in water in which it has been soaked.

In constructing multiple-choice exercises none of the proposed answers should be too obviously incorrect. An

¹WOOD, BEN D.—"Studies of Achievement Tests," *Journal of Educational Psychology*, 17:1-22, January, 1926.

²The name "recognition exercises" has also been used.

exercise can yield an indication of a student's achievement only when he is forced to use judgment in determining which of the suggested answers is suitable. For example, the exercise, "The first president of the United States was: Christopher Columbus, Benjamin Franklin, George Washington, Thomas Jefferson," would be practically worthless for testing purposes if all the names except that of George Washington were of persons living to-day or of persons having no connection with our national life. In applying this type of exercise to the field of mathematics the proposed answers should include erroneous answers which students are inclined to give. For example, if the exercise calls for the quotient of two fractions, one of the proposed answers should be the product of the fractions and another their sum, and perhaps another should be the fraction obtained by taking the sum of the numerators as a new numerator and the sum of the denominators for a new denominator. When the correct answer is included in such a group the student who does not know how to find the quotient of two fractions will be unable to determine the correct answer except as a matter of chance. On the other hand, if all of the answers except the correct one were obviously incorrect, a bright student who knew nothing about division of fractions would be able to select the correct one. The correct answer should not always be found in the same position in the group; sometimes it should be first, sometimes last, and sometimes in an intermediate position. As in the case of the true-false examination, a multiple-choice examination should consist of a large number of exercises.

A somewhat unusual but interesting type of multiple-choice exercise is that described as a "matching test." In this a student is given two lists of statements, the first

numbered 1, 2, 3, 4, 5, etc., the second marked A, B, C, D, E, etc. In the second list there is a statement which corresponds in meaning to a statement in the first list and the student is to pair these statements. For example, in the exercises given below, the student would place the letter B before the date marked (5), 1898, to indicate the event for which that date is significant. The following illustrative exercise is taken from the Spokane United States History Test. The student is asked to match the dates and events.

1. 1846	A. Lincoln's Emancipation Proclamation
2. 1865	B. Spanish-American War
3. 1863	C. Beginning of World War
4. 1917	D. Declaration of Independence
5. 1898	E. United States entered World War
6. 1789	F. Election of Washington as President
7. 1793	G. War with Mexico began
8. 1776	H. Invention of the cotton gin
9. 1861	I. Lee's surrender at Appomattox
10. 1914	J. Beginning of Civil War

A "new examination" consisting of multiple-choice exercises should be mimeographed or printed and each student should have a copy. Definite instructions concerning methods of work should be given. It is probably best to instruct the student to work through the test rapidly, answering those exercises about which he is certain. He should then go back over the list and try the more difficult ones. In general, it is wise to give not fewer than four proposed answers. When this is done the students may be instructed to guess if they do not know, since the chance of success by guessing is slight. The student's score on an examination of this type may be taken as the number of exercises done correctly.

(3) *Directions for constructing completion exercises.*—

A completion exercise, as the name implies, is a statement from which one or more words or phrases have been omitted, the student being asked to “complete” the statement. The omissions are indicated by blanks, but the exercise should be constructed so that there will be no direct suggestion of the terms to be supplied. In constructing completion exercises the teacher should bear in mind that their value for testing purposes is dependent upon the student’s performance being valid evidence of his achievement. Hence, it is important that the omitted words and phrases be such that only students who “know” the topic can supply the correct ones. Furthermore, the facts to be supplied should be important. The best plan is to prepare a list of important statements and principles covering the portion of the subject over which the students are to be examined and then from these statements to strike out significant words or phrases. In every case, if it is possible, the words omitted should be such that only one answer will be correct. Since little writing is required of the students they may be asked to fill in as many as one hundred blanks. The following are illustrations of completion exercises:

Our national government derives its authority from the
of the United States through our national

The legislative power granted to the national government is vested in a Congress of houses, the smaller of which is called the and the larger the

The Fifteenth Amendment of the United States Constitution prevents the states from denying to citizens the right to vote on account of,, or previous condition of

Most of the revenue for state and local governments is secured by a on

The first permanent English settlements in America were made in what is now the state of

The scoring of completion exercises is not as highly objective as in the two preceding types. Students will tend to write a variety of words in the blanks. Different words may have almost the same meaning, and frequently the scorer will be compelled to determine whether the meaning of some word is sufficiently near that of the correct answer to justify giving the student credit for having answered the exercise correctly. However, by a careful selection of statements and of the omitted words, this subjectivity may be greatly minimized. In using completion exercises it is necessary to provide each student with a mimeographed or printed copy of the examination. The student's score is the number of blanks filled in correctly.

IV. Selection and use of standardized tests.—No list of available standardized tests is given here because any list would soon be out of date owing to the fact that new tests are being developed. Several of the texts on educational measurements¹ describe many of the tests that were available at the time the manuscript was written and occasionally a list of available tests is published in pamphlet form.² A large number of standardized tests are published by the Public School Publishing Company, Bloomington, Illinois; World Book Company, Yonkers, New York; and Bureau of Publications, Teachers College, Columbia University, New York City. The teacher will

¹For example, see: MONROE, WALTER S., DE VOSS, JAMES C., and KELLY, F. J. —*Educational Tests and Measurements, Revised and Enlarged Edition*. Boston: Houghton Mifflin Company, 1924, pp. 296-325.

²ODELL, C. W. —“Educational Tests for Use in High Schools, Revised.” Bureau of Educational Research Circular No. 34. University of Illinois Bulletin, Vol. 22, No. 37, Urbana: University of Illinois, 1925, 19 pp.

find it helpful to write to these companies and other publishers of whom he may know asking for a price list. It is advisable to secure a sample set of the tests that appear promising.

Standardized tests differ with respect to function as well as in validity and reliability. For example, there are several standardized tests in the field of first-year algebra and in general each one measures a different combination of achievements. Similarly in Latin the available tests differ in function. Unfortunately the function of a standardized test is seldom clearly indicated by its title and frequently it is not accompanied by an explicit statement of the function. Hence in selecting a test, a teacher must first determine the function of the available tests. Then from those that appear to be suited to his needs from the standpoint of function, he should choose the one that will yield the most valid and most reliable measures of achievement.

Before using a standardized test a teacher should seek information. Frequently information in regard to validity and reliability may be found in the account of the construction of the test or in reports of its use by others. When this information is not obtainable, it is frequently possible to detect faults by a critical examination. In selecting a test it is advisable to seek the advice of a competent authority. In general, a test should not be used unless it is accompanied by adequate directions.

In administering the test and in scoring the papers, it is important that the teacher follow the directions of the author. Departures from the directions is likely to result in erroneous interpretations of the results.

The scores which the test yields should be interpreted intelligently. Standardized tests are not perfect measuring instruments and a good test may be misused, sometimes

unwittingly. It is difficult to control testing conditions. Variable errors are always present, and very frequently a group of scores will involve a significant constant error. Finally the norms are likely to be only tentative.

Translating "scores" into "grades."—In translating "scores" into "grades" it is necessary to have a norm or standard of some kind. For standardized tests norms have been determined which specify what the average scores of certain groups of students should be. These norms are objective. When one of the other three measurement procedures is used, and the "scores" are treated as "grades," a subjective norm is implied in the difficulty of the exercises the students are asked to do and in the scoring. The students receive high "grades" if the examination is "easy" and low ones if it is "hard." It is only when the examination is average in difficulty and the scoring is average in severity that a teacher is justified in treating "scores" as "grades."

The average of a set of "scores" may be used as a basis for translating them into "grades." In the case of a typical class the "average score" should be translated into the "average grade." For example, if the average grade is 85 and the average score of an average class is 57, the grade corresponding to this score would be 85. In case the class is made up of poor students the average score would correspond to some grade below average. If the class is unusually bright an average score would correspond to some grade higher than the average. The translation of the average score into the appropriate corresponding grade furnishes a basis for the translation of the other scores of the group.

The procedure just outlined is necessarily crude. It is partially subjective because the determination of the gen-

eral status of the class is left to the teacher. However, if the teacher is experienced and he has had the class for several weeks he will usually be able to estimate its general status with a fair degree of accuracy. At the beginning of a school year or in the case of an inexperienced teacher some outside information is needed. The previous school record of the students may be studied, but in many cases it will be more convenient to administer a general intelligence test. The average mental age and the distribution of the I. Q.'s of the class will be a very reliable index of the composition of the group. If the median I. Q. is distinctly below 100 the teacher may know that he has poor student material. If it is much above 100 he knows that the class consists of students better than the average. If there is an unusually large number of low I. Q.'s he may expect a relatively large number of low grades.

The use of a standard distribution in translating "scores" into "grades."—For several years a number of educators have been urging that teachers make the distribution of their grades conform to a standard shape, i.e., that a specified per cent of the members of a typical class be given a grade of A, another specified per cent a grade of B, and so on for each of the marks adopted by the school.¹ A number of distributions have been recommended. For a five-point system of grades several authors have recommended the distribution, 7, 24, 38, 24, 7. Other distributions which have been advocated are 7, 18, 50, 18, 7; and 5, 15, 60, 15, 5.

There is considerable evidence which indicates that the distribution of accurate measures of the achievement of an unselected group of students approximates the normal

¹If grades are expressed in per cents the corresponding intervals such as 95 to 100, 90 to 94, and so forth would be used instead of A, B, C, and so forth.

probability curve.¹ The acceptance of this principle does not fix the per cent of students who are to receive each grade. The normal probability curve may be divided in many ways, for example, it is possible to divide the curve so that there would be 50 per cent of A's, 20 per cent of B's, 10 per cent of C's, 10 per cent of D's, and 10 per cent of E's. In such a distribution a grade of A would be given to all students above the average of the class and each of the other grades would be given a corresponding meaning.

A symmetrical division of the distribution of scores has certain advantages and it is probably best to use one of those mentioned, or at least a slight modification of one of them. The particular one to be used is a matter of policy which each school should determine. Some argue that different standard distributions be adopted for the different years of the high school and the different school subjects. It should be noted, however, that there are certain advantages in uniformity, and until more evidence is available it appears wise for all high schools, particularly those in a given state, to agree upon a common standard distribution and to use it for all subjects. Grades assigned in different schools can have a common meaning only when they conform to the same standard distribution.

The proposal that teachers make the distributions of their grades conform to a standard shape has met with much criticism. As in other controversies there have been extremists on both sides and many of those participating have given evidence that they failed to understand clearly the essential features of the proposal. Among the advocates of the use of a standard distribution are those who

¹The normal probability curve is bell shaped and is symmetrical with the average or median at the center.

have insisted that the normal probability curve explicitly defines the per cent of students who must receive A's, who must receive B's, and so forth. Cases have been reported of instructors who frankly admitted that a certain student deserved to receive an A but that they had used up all the A's which the distribution allowed, and hence the student must be satisfied with a B. One hears also of instructors who announce at the beginning of a course that a certain number of the class must fail. It is rumored that in some instances certain students who were indifferent to their scholastic standing have been hired to enter the course in order to provide the requisite number of failures. The opponents of the use of a standard distribution have contended that there is no a priori reason why any student should fail and that always the quality of the student's work should determine his scholastic standing. Furthermore, they have pointed out that in any group of students brought together for instructional purposes it is extremely unlikely that the distribution of achievement will approximate at all closely a predetermined standard distribution. The mechanical and unintelligent application of a standard distribution by some instructors has given the opponents of the plan concrete examples of what they have claimed to be the normal result of its use.

A standard distribution is merely a device which teachers may use in order to reduce to a minimum the constant errors in their grades, but to be helpful it must be used intelligently. It must be remembered that a standard distribution is a means and not an end. Whenever common sense indicates that the distribution of grades for a particular class should depart from the standard distribution, no instructor should hesitate to award the grades which he believes his students deserve. A standard distribution will be

74	A	closely approximated only in large unselected groups of students. Relatively few classes in high school include more than 35 students and not infrequently the group is selected. Hence significant departures from a standard distribution may be expected. On the other hand, the distribution of grades will frequently approach the standard shape.
73		
70		
69		
68	B	An illustration of translating "scores" into "grades." The scores may or may not be on the scale of 100 points. In order to avoid confusion between "scores" and "grades" it is wise to use a scale of points so that the maximum score will not be 100. When the scores do not number more than 25, they may be arranged in descending order as shown in the margin. If the class is an average one, the indicated grades would probably be assigned, provided that the school has adopted a five-point system of grades which assumes a standard distribution of the type indicated.
68		
64		
60		
58	C	
57		
56		
55		
54	D	
51		
50		
47		
46	E	
42		
41		
40		
38		
35		
32		

It is seldom that one will have a symmetrical distribution of grades in a class of this size. Some departures from the standard distribution must be expected. In case the class is not typical one should expect a departure from the standard distribution. For example, if the scores used in the preceding illustration had been made by a class known to be somewhat better than average the grades might be as shown below. In this case there are no failures but there are a number of poor students just above the

passing mark. Also the per cent of A's and B's is unusually large. Such a distribution is not normal but might well represent the distribution of grades for a particular class even when the normal distribution had been adopted as the standard. If the teacher is able to show that the general status of the class justifies such a departure he deserves commendation rather than criticism for the form of the distribution.

				64
				63
42				
41	54	60	74	
40	51	58	73	
38	50	57	70	
35	47	56	69	
32	46	55	68	
E	D	C	B	A

An accumulative distribution used as a check upon constant errors.—A standard distribution is also useful as a check upon the grades given by a teacher over a period of several terms. When the grades for such a period are assembled in a distribution any general tendency on the part of the teacher to give grades that are too high or too low will be revealed. Each teacher should keep an accumulative distribution of the grades in each subject he teaches. For example, a teacher in mathematics should keep an accumulative distribution of the grades given in classes of first-year algebra. When the total number of grades becomes large, a comparison of this distribution with the standard distribution adopted by the school will reveal any tendency on the part of the teacher to grade too high or too low in this subject. He should then take steps to correct any marked departures from the practice defined by the standard distribution. In large high schools where

there are several sections of the same subject it will be helpful for the principal or someone working under his direction to compile distributions of grades each time they are issued. This procedure will reveal any marked departures from the standard distribution. When such a condition is revealed the teachers concerned should inquire concerning the cause. If evidence can be produced which justifies the departure no change in the system of grading should be made. On the other hand, when investigation reveals no reasons why there should be departures from the standard distribution, the teachers should be urged to modify their system of grading so that a greater uniformity will be secured.

Calculating final grades.—Many critics of written examinations have asserted that a single examination which in high school rarely extends beyond two hours, does not offer an adequate opportunity for a student to demonstrate his ability. This criticism is frequently expressed in the statement that it is unjust to base a student's standing for a semester or a year on an examination paper written during a brief final examination period. When stated in this way the criticism refers to two issues between which there is failure to distinguish. The first is in regard to the weight which should be allowed the final examination grade in determining a student's standing in a course. This question has no relation to the validity or accuracy of examination grades and should not be introduced when considering these matters. The second issue refers to the inaccuracy of the grade due to the limited opportunity which is given the student to demonstrate his ability. For practical reasons it is necessary that measurement of the total achievement for a term be based upon a sample. Measurement by means of samples is a method employed

quite generally in the sale of commodities such as wheat, corn, steel, etc. If the sample is representative, the resulting measures are not inaccurate because the entire commodity was not measured. The same reasoning applies to measurement of achievement by samples. It is difficult to secure a representative sample of achievement, but when an examination is carefully prepared this is not a serious criticism. Increasing the scope of the examination will tend to increase the accuracy of the measures yielded.

The grade made on a final examination should seldom if ever be the only basis of a student's standing in the course. The teacher's estimates of his achievements throughout the term and the grades made on tests during this period should also be included. Probably the most frequent practice is to take the average of the three grades, teacher's estimate, term average of test grades, and final examination grade as a student's final standing. Few high-school teachers count the final examination grade as less than one fourth and very few give it as much as one half.

When the grades recorded during the term are expressed in terms of letters, teachers frequently make a serious error when averaging them to determine final standing. For example, the grades, A, A, A, A, and B are translated into their numerical equivalents 5, 5, 5, 5, and 4. The average is 4.8 which is translated into B, or B+ if such a symbol is permitted. This practice is wrong. If a grade of A is equivalent to 5 then any average greater than 4.5 should be translated into a grade of A. Similarly if 1 is the numerical equivalent of E (failure), an average of 1.5 or less should be translated into E.

The importance of final examinations.—Many persons contend that the traditional practice of giving a written examination at the end of the term or semester is not justi-

fied and hence that final examinations should be abolished. This has been done in a few high schools but the reasons advanced for this action do not appear to justify it.

The value of a final examination is not the same for all subjects. In shop work, sewing, stenography, typewriting, and other subjects in which the purpose is primarily to engender specific habits whose functioning produces an observable performance the need for a final examination is much less than in such subjects as algebra, geometry, physics, and history. In the latter class of subjects it is unwise to abolish the final examination. It is needed for purposes of measurement as well as to stimulate the review of the course.

It is a common practice to grant exemptions from the final examination to those students who meet certain requirements. This also is unwise. It tends to create a wrong attitude toward final examinations. Both students and teachers are inclined to look upon them as a penalty rather than as an essential phase of learning and teaching.

The final examination in itself provides a distinct type of educational opportunity which does not occur elsewhere in the course. This is particularly true in the case of questions which require reasoning and organization of information. Although the writer has no evidence to present upon this point he is convinced from his experience with college students and from the comments of a number who have been exempted from final examinations in high school that the practice deprives students of an important educational opportunity. Not infrequently students who have been "excused from examinations" in high school state that they experienced a distinct handicap when they entered college. If final examinations can be justified they should be required of all students. To use them only as a

device for motivating the work of the term destroys much of their value.

The effect of final examinations upon the learning process.—Many critics have claimed that examinations, particularly those given at the end of a course, tend to encourage “cramming” which is assumed to represent a very undesirable type of learning. The assertion is made that when it is the practice to give a final examination many students do little or no studying until near the close of the term. Then by the process of “cramming” they are able to pass the final examination and attain a relatively high standing in the course. The neglect of study throughout the term is not due so much to the fact that final examinations are given as to the failure of the teacher to measure the student’s achievements from time to time during the term.

If the studying which students do prior to a final examination is subject to criticism, the undesirable characteristics are inherent in the type of learning activity rather than due to its intensiveness. Doubtless much of the “cramming” which students do is not highly efficient as a learning activity. Memorization of facts and statements frequently predominates; understanding and organization are minimized. This condition suggests that teachers should seek to eliminate the evils of “cramming” by instructing students in appropriate methods of reviewing for examinations rather than by urging the abolition of final examinations. Incidentally, it may be noted that students are much more likely to engage in desirable learning activities when preparing for an examination if they have been required to “master” the daily assignments. Final examinations should not be blamed for the laxness of the teacher throughout the term.

Effect of final examinations upon the health of students.

—Some critics claim that written examinations, particularly those given at the end of a course, are injurious to the health of students, many of whom make very strenuous preparation for such tests. It is undoubtedly true that both the preparation and the writing of an examination frequently make enormous drains on the energies of students. However, no dependable evidence has come to the attention of the writer which shows that final examinations tend to injure the health of high-school students. A few may be so lacking in physical fitness that they should not be required to take the regular examinations, but it is customary to excuse such students from other school exercises. When one observes the great expenditures of time and energy devoted to social and athletic activities, it is difficult to believe that examinations are in general more injurious to the health of students than many other activities in which they are permitted and even encouraged to engage. Here again it should be realized that this criticism is not fundamentally a criticism of examinations, but rather of setting very long examinations or of placing extreme emphasis upon them by making the final grade of the course depend wholly or very largely upon the examination grade.

Time devoted by teachers to written examinations.—

In the opinion of some critics the time given by teachers to the preparation of questions and particularly to the marking of examination papers might be more profitably employed. It has already been pointed out that measurement of achievement is essential to good teaching. A teacher cannot attain a high level of efficiency as an instructor unless he checks up the work of his students in order to assist those who need supplementary and remedial

instruction. Only by knowing the extent to which his students have achieved is he able to assign appropriate supplementary learning exercises.

Marking examination papers and other written work to indicate errors and corrections.—In scoring examination papers and other written work many teachers are accustomed to indicate the errors made by the students and in some cases to suggest the necessary corrections. One may properly question the wisdom of this practice which involves the return of the papers to the students. In some cases the indication of errors may increase the accuracy of the measures of achievement by making the process of evaluation more systematic, but in many cases it tends to cause the teacher to focus his attention upon the more objective errors of form and structure and to disregard the more fundamental errors of thinking and the lack of ideas. When this occurs the validity of the measures is affected. Furthermore, indicating errors requires time, and a teacher who does it carefully may be distributing his time unwisely. Frequently the most significant faults of an essay type of response cannot be indicated in detail without writing a criticism greater in length than the student's performance.

The marking of papers so as to indicate the errors in detail, even in such subjects as mathematics, becomes drudgery and when much written work is required the demand upon the teacher's time is large. For these reasons some teachers advocate the consignment of at least a portion of the written work to the waste basket without reading it. The wisdom of this practice depends upon the amount of written work the teacher requires. When his classes are large and it seems desirable to make a number of written assignments or to give frequent written examinations of the essay type, the teacher may be justified in

destroying without reading a portion of the written work received from his students.

Another practice is to read the papers but not to return them to the students. There is some justification for doing this. When written work is returned students frequently compare papers, and in many schools it is fashionable to require the teacher to present objective evidence for the judgments represented by the grades assigned. Where this condition prevails attention is focused on errors in form and definite errors of statement with the result that more important faults are neglected. If written work is not returned, students are deprived of the opportunity of making comparisons and are less likely to assume that the only faults in written work are those for which objective evidence may be cited.

On the other hand, the correction of errors and other faults by students is an efficient learning activity, and a high-school teacher who does not attempt to direct the attention of his students to the faults in examination papers and other written work fails to capitalize important instructional opportunities. However, indicating the errors and other faults in detail is not the only way that they may be brought to the attention of the students. The teacher may indicate the general character of the prominent faults by such phrases as "misspelled words," "grammatical errors," "answer incomplete," "statements not clear," and the like. If the use of such phrases in the marking of written work of the essay type is supplemented by a class discussion of some of the typical faults, the result may be as satisfactory as that obtained when the papers are marked in detail. In fact, it is conceivable that the results might be superior. The teacher would have more time for studying and planning his teaching and the

students would be required to assume some responsibility for the detection of their own errors. Frequently students are handicapped in their learning because they are unable to evaluate their own work.

Although no definite rule can be stated it appears that a teacher should not consider that he must indicate in detail the errors in all written work. Neither is it imperative that all papers be returned to the students. In general, he should endeavor to direct the attention of his students to the errors, but frequently it is advisable to insist that they assume much of the responsibility for detecting the errors. When written work is not returned, the significant faults should be commented on in class and if possible any student who so desires should be granted the privilege of a conference with the teacher.

LEARNING EXERCISES FOR THE READER

1. What distinctions between information and knowledge should be recognized in attempting to measure knowledge achievements?

2. High-school principals and teachers sometimes ask what should be the passing mark? Should it be 60, 70, 75, or some other grade on a scale of 100? How would you answer such a question?

3. Distinguish between a score and a grade. What is the meaning of "translating scores into grades"?

4. Are the differences in achievement indicated by grades quantitative or qualitative? Which should they be? Why?

5. Prepare a list of thought questions for Chapters XV and XVI of this text.

6. Prepare a new examination on the same chapters and compare the achievement measured with those that you judge would be measured by the thought questions.

7. What is the meaning of saying, $A = 95$ to 100 , $B = 85$ to 94 , etc.? How should a passing mark be determined?

8. Explain the meaning of "subjective norm" as used on page 524.

9. Compile a list of different kinds of objective exercises. Examine the references given on pages 514-5 and any other sources that you may know of.

10. How should final grades be determined?

11. Prepare a list of different types of thought questions. Try to include as many types as possible. (See page 255.)

12. In the discussion of adjustments to individual differences, it was asserted that the differences in achievement should be controlled so that they would tend to be quantitative rather than primarily qualitative. (See page 389.) If this principle is accepted, how will it affect the measurement of achievement? (See also page 503 f).

13. From the standpoint of determining grades, what is the value of a plan such as described on page 528 f? Will such a plan affect the accuracy or validity of the measures of achievement? Why?

CHAPTER XVII

THE PLANNING OF TEACHING

Relation of this chapter to the preceding chapters.—“Lesson plan” is the name for a statement of the things a teacher proposes to do during the period he spends with his class. In preparing a lesson plan a teacher should be guided by the principles set forth in the preceding chapters. Thus a discussion of lesson planning forms a logical conclusion for a treatise on methods of teaching. In the preceding chapters the discussions have been analytical. Learning activity was analyzed into certain types; the outcomes of learning were grouped under three major headings; reading was analyzed on the basis of the reader’s purpose; motivation, adaptation of instructional procedures to individual difference, supervised study, and the project method were considered in separate chapters. In planning a lesson the teacher has an opportunity to synthesize and apply the principles and suggestions relating to the various phases of his task. Consequently the reader should have the discussions of the preceding chapters clearly in mind. Unless the study of this text has included a cumulative review, he should review the preceding chapters, especially the first ten.

A lesson plan necessary for good teaching.—The teacher’s task is complex and most of the actual stimulation and direction of learning takes place during the relatively short period that he spends with his class. Frequently this class is “large” and the members of it usually differ in

significant respects. Learning activities and especially emotional responses are difficult to direct and errors tend to persist. A teacher should never go before a class without having previously prepared definite plans for the work of the period. It is not sufficient for the teacher to be thoroughly familiar with the general topic the class is studying. He must in addition have a carefully prepared plan for the conduct of the recitation. As a part of his preparation the teacher should determine what topics, if any, are to be reviewed; decide upon the points to be taken up in the advanced work; formulate the central or pivotal questions to be asked during the period; devise plans for discovering faults in the learning of his students, and formulate the learning exercises to be assigned.

Until a teacher has become very familiar with the teaching of a subject he should prepare a somewhat detailed lesson plan. Setting one's ideas down in writing usually assists in clarifying and organizing them.¹ Thus, the teacher who writes out his lesson plans usually prepares better ones than those who do not. If the plan is not reduced to writing the teacher is likely to fail to remember portions of it during the recitation; but more important, there will usually be a distinct tendency to slight the planning of the lesson.

Lesson planning and the project method.—The following discussion assumes that the assignment method is followed and that a period is provided for recitation. When the instruction conforms to the project method the planning of lessons becomes greatly modified, but the teacher should not assume that he has no need to plan his work. When instruction is laboratorized or otherwise modified the lesson plans should be changed accordingly.

¹See the discussion of expression as a learning activity, page 282.

Good lesson plans difficult to formulate.—In some high schools teachers are required to file written lesson plans with the principal and even when not required to do so many teachers write out a plan, at least in abbreviated form. Examination of typical plans indicates that few teachers know how to formulate a good lesson plan. Colvin makes the following statement based on his experience in training high-school teachers and his observations of teaching: "During the past six years I have had under my direction a considerable number of graduate students in Brown University who have been engaged in intensive work in practice-teaching in various high schools in Providence and its environs. These teachers have spent in teaching from one to three periods a day for an entire academic year. On the average, they are in ability and training clearly superior to the beginning high-school teacher. It can be assumed, therefore, that the faults that these cadet teachers show exist in a still greater degree among novices in high-school teaching. From the outset of their training I have emphasized with these cadet teachers the importance of a well-constructed lesson plan, and I have invariably found that at first they had absolutely no conception of how to prepare a helpful working scheme of conducting their recitations."¹

The essential elements of a lesson plan.—As indicated in a preceding paragraph, a lesson plan is primarily a description of what the teacher is to do during the recitation period, but as a basis for this planning, a formulation of objectives is needed. Hence, a complete lesson plan would include the following items:

¹COLVIN, S. S.—"The Most Common Faults of Beginning High-school Teachers." *The Eighteenth Yearbook* of the National Society for the Study of Education, Part I. Bloomington, Illinois: Public School Publishing Company, 1919, p. 266.

- I. Objectives or aims.
 - A. Ultimate objectives, i. e., the general aim for the subject or for a major topic of it.
 - B. Immediate objectives expressed in terms of the controls of conduct to be acquired by the students. (See page 66 f.)
- II. Learning exercises. (These include questions and other exercises to be answered during the recitation period as well as those to be assigned for home study.)
- III. Motivation procedures.
- IV. Directions and suggestions for doing the learning exercises assigned.
- V. Test exercises for diagnosing learning activities and achievements.

The form of a lesson plan.—This list of the essential divisions of a lesson plan may be used as an outline in writing a plan but variations are frequently permissible. There is no single fixed formula for teaching.¹ Hence the form of the lesson plan may vary. It is advisable for the teacher to write out carefully worded statements of the objectives, especially the immediate objectives. These are needed as a basis for devising and selecting the learning exercises which may be grouped under three headings: (1) review, (2) recitation, and (3) assignment. The time devoted to review will vary. Sometimes it may occupy most of the class period. At other times it may be omitted al-

¹An opposite view has sometimes been held by the enthusiasts for a particular "method." For example, in McMURRY, CHARLES A., and McMURRY, FRANK M. —*Method of the Recitation*. New York: The Macmillan Company, 1905, p. 288, we find these statements: "If the leading thoughts thus far presented are true, there are certain steps in instruction that are universal . . . they are rightly called the Formal Steps of Instruction." For a description of the "formal steps" see page 167 of this text.

together. When a new topic is taken up the entire recitation may be devoted to the advanced assignment. When the study of a topic extends over two or three days it will frequently happen that little time will be required for the advanced assignment after the first day, since the students are to continue work on the assignment already made. As the time to be devoted to review and to the advanced assignment varies there will be a corresponding variation in the time available for supplementing the study of the topic previous to the meeting of the class. Consequently the plan for some lessons will be devoted largely to review; for others it will deal only with the assignment; and for still others the review and assignment may be omitted.

In many cases the motivation will be secured by the nature of the learning exercises and the way in which they are assigned.¹ Hence there will seldom be occasion for an explicit division of a lesson plan to be devoted to motivation. However, in planning a lesson the teacher must keep in mind that he is responsible for stimulating learning activity as well as for directing it.

Diagnosis is important in directing the learning activities of students. The teacher should always give attention to planning this phase of his task. Frequently the learning exercises will yield performances that may be used as a basis for inferences concerning achievements as well as for the learning activities of the students. Hence in many lesson plans it will not be necessary to include a separate section for test exercises.

In view of the preceding discussion the following items will usually suffice for the headings of the principal divisions of a lesson plan.

¹See the discussion of motivation in Chapter IV, especially pages 102-4.

SCHOOL SUBJECT

GENERAL TOPIC.....

- I. Objectives
 - A. Ultimate
 - B. Immediate
- II. Learning exercises
 - A. Review
 - B. Recitation
 - C. Assignment

Other writers on methods of teaching have recommended different forms. For example, Burton¹ employs the following headings:

- I. Subject-matter
 - Teacher's Aim
 - General
 - Specific
 - Analysis of the Aim
 - Sources and References
- II. Method
 - Pupil's Aim
 - Presentation
 - Comparison and Generalization
 - Application

A double-column arrangement has been endorsed by many writers.² "Subject-matter" and "method" have

¹BURTON, WILLIAM H.—*Supervision and the Improvement of Teaching*. New York: D. Appleton and Company, 1922, pp. 443-502.

²This form appears to have been due to Herbartian influence. See: McMURRY, CHARLES A., and McMURRY, FRANK M.—*The Method of the Recitation*. New York: The Macmillan Company, 1903, Chapter XIV. CHARTERS, W. W.—*Methods of Teaching, Revised and Enlarged Edition*. Chicago: Row, Peterson and Company, 1912, Chapter XXV. PARKER, S. C.—*Methods of Teaching in High Schools, Revised Edition*. Boston: Ginn and Company, 1920, Chapter XXI. MOSSMAN, LOIS COFFEY.—"Changing Conceptions Relative to the Planning of Lessons." Teachers College, Columbia University, Contributions to Education, No. 147. New York: Bureau of Publications, 1924, 72 pp.

usually been used as headings. In 1919, Wilson¹ stated that the following form of lesson plan is fairly representative of those used in many schools.

SUBJECT OF DAY'S WORK

- I. Aim: (In definite statement, not topic form.)
- II. Basis assumed: (That which the teacher assumes the pupil must know and does know as a basis for comprehending the new lesson.)
- III. Preparation: (Recall of facts, creating atmosphere for particular work; stimulating class by giving incentive for day's work; statement of pupil's aim by teacher or pupils.)
- IV. Presentation: 1. Thought steps, in statement forms, logical order, and general summary. 2. Methods or devices; pivotal questions and special devices numbered to correspond with parallel thought steps.
- V. Assignment: 1. For class study period. 2. General statement of problems for next teaching lesson.

These outlines of lesson plans do not appear to be as satisfactory as the one recommended on page 544. Several of the captions suggest teacher activity rather than student activity; the devising and selecting of learning exercises is not emphasized.

A lesson plan should usually be an integral part of a larger unit.—The lesson for a single day almost always constitutes a portion of some larger unit of the course. It cannot be planned effectively without taking into consideration its relation to the other phases of the larger unit. The proper procedure is to outline the larger unit, subdivide it into daily lessons, and then plan these in detail

¹WILSON, LESTER M.—"Training Departments in the State Normal Schools in the United States." *The Normal School Bulletin*, No. 66. Charleston, Illinois: Eastern Illinois State Normal School, 1919, p. 85.

and in relation to each other as a group and not as isolated lessons. This will lead the teacher to see what is coming in the future and to relate the work of the present to that which will follow. Planning in large units will assist in preventing fragmentary learning such as tends to develop if each day's lesson is planned independently of those which are to come.

An outline a poor type of lesson plan.—Some teachers appear to be under the impression that an outline of the subject-matter of a course, if made sufficiently detailed, will serve as a substitute for the planning of lessons throughout the term. An outline, as shown on page 417, is usually nothing more than a list of topics about which the students are to learn something. Hence it cannot be considered as more than a poor statement of immediate objectives. Learning exercises are not included.

Relation of course of study to the planning of lessons.—A course of study¹ should furnish a statement of objectives, both ultimate and immediate, but frequently those listed will be more general and remote than the immediate objectives which form the goals of the daily instructional efforts of the teacher. Consequently a course of study does not absolve the teacher from the responsibility for determining immediate objectives. A course of study should suggest appropriate types of learning exercises, but

¹In much of the general usage of the terms "curriculum" and "course of study" there is a lack of precise meaning. By some writers they appear to be used synonymously. Others make the course of study a division of the curriculum.

In spite of inconsistencies there appears to be a reasonable uniformity in regard to one distinction. Curriculum is used as a name for a designation of a body of subject-matter, or the "ground to be covered." This may be expressed in the form of an outline or a syllabus. Recently several curricula have been expressed in terms of objectives to be attained. The scope of the subject-matter may be small, as when we speak of a "curriculum in spelling" or a "curriculum in pronouns"; or large when we refer to the "curriculum of elementary education,"

the teacher must accept the responsibility for devising many of those that he uses. A course of study will serve as a guide to the teacher and tend to insure a better organization of the instruction throughout the term or year.

Relation of lesson planning to a textbook.—Most subject courses in the high school are based upon a textbook which has been carefully prepared as an instructional tool. In most cases the text provides a number of learning exercises and frequently directions and suggestions for doing them are also given. In some subjects the text is explicitly divided into "lessons." In view of the character of many of the texts used in American high schools, it may appear that when a course is based on an adopted text, the need for the planning of lessons will be eliminated. In the case of algebra, geometry, and other subjects in which a text is largely a compilation of learning exercises, the planning of lessons is greatly simplified, but efficient teaching will seldom be attained, at least by teachers of little or no experience, without some attention to planning the activities of the class period.

In addition to learning exercises textbooks contain the following types of material:

"curriculum of the secondary school," or "curriculum in architectural engineering." In all of these cases the purpose is to designate the boundaries of a body of subject-matter which may be either large or small.

"Course of study" is the name given to the specifications and directions relating to a given field of instruction. These specifications and directions include in addition to the objectives to be attained (implied in "ground to be covered") directions and suggestions relating to what the teacher should do in getting his students to achieve these objectives.

The course of study may deal with a small body of subject-matter: for example, the "course of study for the first half of the fourth grade in arithmetic." On the other hand, it might refer to the work covering a period of several years, as the "course of study in arithmetic, Grades I to VIII." The term is even used when several subjects are included, as the "course of study for the elementary school."

- I. Statements of fact.
- II. Descriptions of experiences.
- III. Records of thinking such as arguments or demonstrations of geometrical theorems and expositions.
- IV. Products of generalizing experience or other thinking expressed by words, phrases, and sentences.
- V. Descriptions or expressions of feelings.

These types of material, sometimes designated as subject-matter, are not learning exercises; they are only material on which learning exercises may be based. Consequently appropriate learning exercises must be devised. If the teacher does not devise appropriate learning exercises, the students will assume that they are to read the text for the purpose of remembering the symbols of knowledge.¹

In formulating plans the question arises, "Should the successive lessons conform to the order of the text, or is the teacher justified in working out a sequence of lessons which in his judgment is best adapted to the objectives of the course?" A categorical answer cannot be given to this question because what a teacher should do in a given case depends upon the text used and the objectives he is directing his students to attain. However, it is best to be conservative and depart from the order of the text only when there are good reasons for doing so. Although textbooks are not perfect instruments of instruction and some of them appear to violate sound pedagogical principles, most of them have been prepared with a great deal of care and are deserving of respect. When a teacher omits sections of the text or modifies the order, his students are likely to

¹See discussion of control of reading purposes, page 197f.

acquire a dislike for it and to offer this as an excuse for failure to achieve.

The preceding paragraph is not intended to mean that the teacher should follow a text in a slavish fashion. Omissions and departures from the order of the text are frequently justified. Sometimes the teacher may be required to use a poor text. In many cases it is advantageous to have the text supplemented by the study of other sources. Some teachers have been accused of teaching the text rather than teaching students. In many quarters it has become fashionable to follow no one text and even to abolish a text in the hands of the students. Some experienced teachers are doubtless securing commendable results without using any text in the hands of the members of a class. However, the writer has become convinced that a teacher should maintain a conservative attitude in regard to omissions or other departures from the adopted text.

Teacher's aim versus objectives to be attained by students.—Teachers appear to confuse the definition of their purpose or aim with the specification of the controls of conduct which their students should acquire. Colvin¹ quotes a number of aims in which such expressions as the following are used:

The aim of this lesson is to bring to the attention of the class

The aim of this lesson is to show that

The aim of this lesson is to emphasize

The aim of this lesson is to give the class some appreciation

The aim of this lesson is to present

¹COLVIN, S. S.—*An Introduction to High School Teaching*. New York: The Macmillan Company, 1917, p. 341f.

The aim of this lesson is to bring out the main reasons for

.....

The aim of this lesson is to impress

The aim of this lesson is to consider

The aim of this lesson is to make clear

The aim of this lesson is to prove

The aim of this lesson is to teach

The aim of this lesson is to furnish the pupils with

The aim of this lesson is to discuss

In contrast with the expressions employed in stating the aims quoted by Colvin, the following statements are given:

I. SPECIFIC HABITS

Ability to type simple prose from copy at the rate of 25 words per minute with not more than 3 errors per hundred words.

Ability to swim the length of the tank three times.

Ability to respond promptly to fact questions such as Who was the first President of the United States? When was the Declaration of Independence signed?

Ability to give fluently the declensions of

Ability to carry on a conversation in French about such topics as

Ability to solve equations of the type at the rate of within minutes.

Ability to read fluently expressions (in algebra) such as

Ability to repeat from memory

Ability to bend glass tubing.

Ability to pour liquids.

Ability to recognize the common types and breeds of live stock.

II. KNOWLEDGE

Ability to comprehend statements, both oral and written, which include such terms as (technical terms).

Ability to use fluently such terms as

Ability to define, explain, or illustrate such terms and statements as

Ability to respond satisfactorily to (new) thought questions such as the following:

Ability to classify birds as beneficial or harmful.

Ability to explain the operation of a telephone.

III. GENERAL PATTERNS OF CONDUCT

A strong tendency to conform to the requirements of scientific procedure.

The custom of delaying a response to a thought question until all phases and implications have been considered.

A sensitiveness for grammatical and rhetorical errors.

The two groups of statements represent a difference in point of view that is fundamental. Those of the first group specify teacher activity;¹ those of the second describe what the students are expected to learn. An aim stated in terms of teacher activity suggests that instructional procedures are ends in themselves rather than merely means of stimulating and guiding students in appropriate learning activities.

Immediate versus remote objectives.—The controls of conduct which students are expected to acquire as well as the more remote objectives are described in terms of performance or conduct. Hence the significant difference between these two classes of objectives is the degree of generalness. For example, the following is listed by Bobbitt² as an objective of the social studies:

Ability to protect one's self from social, economic, and political fallacies, illusions, misrepresentations, petty-mindedness, fragmentary-mindedness, sentimentality, selfish prejudices, and the like, through one's continual reliance upon facts and principles.

¹Incidentally they reflect a false concept of the learning process. See pages 2-3.

²BOBBITT, FRANKLIN.—*How to Make a Curriculum*. Boston: Houghton Mifflin Company, 1924, p. 103.

This statement describes future conduct; it does not specify what controls of conduct (specific habits, items of knowledge, and general patterns of conduct) which one must have acquired in order to be efficient in protecting himself from the various conditions mentioned through continual reliance upon facts and principles. It is, of course, implied that one must learn certain "facts and principles" but the ones necessary are not specified. They are not even described or illustrated. In addition the statement gives no indication of the controls of conduct which will insure "continual reliance" upon facts and principles.

Such statements as the one just quoted from Bobbitt are valuable for certain purposes but they describe objectives too general and too remote to serve as goals for the day-by-day efforts of high-school students. There are probably occasions when it is desirable that they envisage the more remote goals toward which they are working, but for the most part their attention will be fixed upon immediate things to be learned. If the teacher is negligent in engendering an understanding of appropriate immediate objectives, they will make their aim the doing of so many exercises, the covering of so much ground. The goals to be achieved by students should be described in as specific terms as possible. If the outcome of the learning is to be knowledge, the particular facts and principles should be specified; for example, ability to solve a quadratic equation of the type $x^2 - 7x + 12 = 0$ by factoring; ability to explain Boyles' Law; ability to recall promptly the important dates, events, and other facts previously studied in history. Such objectives as the following are too general and indefinite: An understanding of the War of 1812; to study the circle in geometry; to read the

first act of the *Merchant of Venice*; to appreciate the *Legend of Sleepy Hollow*; to learn about sound.

Immediate objectives should be expressed in terms of student achievements rather than learning exercises to be done, because the reading of a text, the answering of questions, the solving of problems, etc., are only a means to an end, the attainment of certain achievements. Thus the aim of a lesson in algebra is not the doing of certain exercises but the acquiring of certain items of knowledge and specific habits. The aim of a lesson in history is not the reading of certain pages in a book, or even the answering of certain questions, but the acquiring of certain items of knowledge and perhaps ideals and attitudes. This may appear to be a very subtle point and one of minor importance with reference to the making of lesson plans, but the teacher's concept of the aim of the lesson is likely to influence materially the plans he makes and his teaching.

Devising and selecting learning exercises most important phrase of lesson planning.—The function of learning exercises justifies that statement that the devising and selection of them constitute the most important phase of lesson planning. Many teachers fail to make good plans because they do not make adequate provisions for student activity. For this reason it is desirable for a teacher to emphasize this aspect of his plans. If he finds that they tend to be deficient in this respect, he may adopt the device of listing the provisions for student activity in a separate column. A teacher is successful only as he succeeds in getting his students to be actively engaged in doing the right things.

Planning adaptations to individual differences.—When adaptation to individual differences is secured by means

of differentiated assignments (see page 394 f), it is necessary for the teacher to determine the appropriate levels of achievement and formulate learning exercises appropriate for each level.

A lesson plan should not be followed slavishly.—Although it is important that the teacher prepare a complete lesson plan, it should not be followed slavishly. Even the teacher who knows his students well will not be able to anticipate all of the conditions which will arise. The review may reveal unexpected weaknesses; students may ask questions for which the teacher has not planned. A good teacher will not hesitate to modify his plan at any time so as to adapt his instruction to the revealed needs and interests of his class even though it may mean a radical departure from his carefully prepared plan. On the other hand, a good teacher avoids being misled by questions not pertinent to the lesson and departs from his plan only when he believes there are good reasons for doing so.

Abbreviated lesson plans.—The lesson plans reproduced in the following pages will doubtless impress the reader as being elaborate, perhaps unnecessarily so. This is partly because it has been necessary to include some explanatory statements so that the proposed procedures will be understood by the reader. It is, however, realized that the actual plans prepared by many successful teachers are much less elaborate. Frequently an abbreviated plan will be satisfactory, particularly after the teacher has had a year or two of experience. On the other hand, an abbreviated plan may not represent thoughtful planning, and when this occurs the abbreviation is to be condemned. A teacher should make certain that he has made adequate preparation for each day's work and this will usually require that he plan his teaching in considerable detail.

ILLUSTRATIVE LESSON PLANS.¹SUBJECT: *Botany*²GENERAL TOPIC: *Our Relations with Plants*

FIRST DAY

I. Objectives

A. Ultimate³

1. To arouse interest in plants
2. To give a "mind set" for the study of botany
3. To aid pupils to interpret their environment
4. To afford practice in reflective thinking

B. Immediate

Items of information concerning (a) occupations which are largely dependent directly upon plants or plant products, (b) ways in which plant products enter into our lives. (Several of these items were listed in the plan so that the teacher might have them to refer to.)

II. Learning exercises⁴

- A. Review (Since this is an introductory lesson no review is included.)

¹These plans are not perfect in all respects but each one illustrates several of the principles set forth in the preceding pages.

²Adopted from a plan prepared by W. C. Croxton, published in MONROE, WALTER S.—"The Planning of Teaching," Bureau of Educational Research, Circular No. 31. University of Illinois Bulletin, Vol. 22, No. 7. Urbana: University of Illinois, 1924, 41 pp.

³These are stated in terms of teacher purposes rather than student achievements.

⁴The following assignment was made the previous day:

1. Problem: In what ways do plants affect us?
 - (a) Make a list of industries, occupations, professions, skilled and unskilled labor in Champaign-Urbana and underline those which are largely dependent directly upon plants or plant products.
 - (b) State all of the ways in which plant products have influenced your life to-day.
2. Suggestions for study:

"Where will you get the material for this study?"

"If in doubt as to whether any product is from plants, what will you consult?"

B. Recitation

As pupils enter the room, they will be asked to place on the blackboard the lists they have worked out in their first approach to the solution of our problem.

From these separate lists the class will make up a composite list on the board, a student acting as recorder.

Differences in opinion as to what should be underlined will result in discussions. Where failure to agree is due to lack of information, encyclopedias and other sources will be consulted. Where the evidence is practically equal on both sides, each student will use his judgment in making up his own records and may make a separate column for these cases if he wishes.

The teacher will supplement where necessary.

Pupils will in turn read aloud their lists of ways in which plants have entered into their lives this day.

As each student reads, the others will add to their own individual lists as new ideas are suggested to them.

The student having the most complete list at the end of the readings will read it to the class and will be asked to make a copy of it for the bulletin board.

Plans for continuing the study of our problem tomorrow will then be made.

C. Assignment

1. Problem. In what ways do plants affect us? Are there other ways in which plants are important to us?
 - (a) Summarize in a single statement the direct dependence of the occupations upon plants.
 - (b) In a brief paragraph on each, state the relationship of plants to our food, clothing, shelter, warmth, and conveniences.
 - (c) Make a list of the well-known diseases of man. Check those which are known to be caused by plants.
 - (d) State in your own words the meaning of the poem on the fly leaf of your text. Bring to class

some poem you are unable to understand because of lack of knowledge of plants.

Suggestions for study.

"Where can the information we need for exercise (c) be found?"

No attempt will be made to study bacteria at this time. The teacher will make only such statements concerning them as will be necessary to enable pupils to find the information needed at present. Pupils will be asked to raise questions at this time if they do not understand clearly what is to be done or if they wish further suggestions.

SECOND DAY

I. Objectives

A. Ultimate

1. To arouse interest in plants
2. To give a "mind set" for the study of botany
3. To aid pupils to analyze life situations
4. To afford practice in reflective thinking
5. To correlate botany with English and physiology

B. Immediate

(Not given but would consist of items of information concerning the effect of plants upon us.)

II. Learning exercises

A. Review

Several pupils will be called upon to read their summaries or paragraphs on each topic.

B. Recitation

A list of diseases will be placed upon the blackboard before the class enters the room. Some of the slower pupils will be asked to check those that are caused by plants. Additions and corrections will be made by other pupils and finally by the teacher until a list, as correct as our present knowledge permits, is arrived at. Pupils will be asked the meaning of the poem in the text. A class discussion will follow.

Pupils will read passages they do not understand from

the poems they have selected. The teacher will attempt to explain these if no other member of the class is able to do so.

The remainder of the time (except that reserved for the assignment) will be spent in reading poems selected by the teacher. Pupils will be asked the meaning of passages relating to plant life or the pupils may question the teacher.

- C. Assignment
(Not given.)
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SUBJECT: *Algebra*¹

GENERAL TOPIC: *Addition of Fractions*

FIRST DAY

I. Objectives

A. Ultimate

(Not stated but could be stated as "ability to manipulate algebraic fractions.")

B. Immediate

Formulation of a procedure for adding fractions with a monomial denominator.

II. Learning exercises

A. and B. Exercises for review and recitation are combined.
(Direct questioning with board work.)

1. State a definition of a fraction. (Ask slow students until it is well formulated.)
2. What are its parts?
3. Explain the meaning of these words. (The Latin students will volunteer here.)
4. In the past week's work with fractions what operations have we considered? (Teacher lists these.)
5. Will you give one fundamental principle which will justify our work?

¹Adopted from a plan prepared by S. Helen Taylor, published in MONROE, WALTER S. "The Planning of Teaching." Bureau of Educational Research Circular No. 31. University of Illinois Bulletin, Vol. 22, No. 7. Urbana: University of Illinois, 1924, 41 pp.

6. In addition of fractions we shall need to recall our ideas about algebraic addition. What are the important facts?
7. When are fractions similar? (Let examples be given first. This is a new word as applied to fractions, but after illustrations are offered, class will decide on meaning in this case.)
8. The teacher suggests that several go to the board and add some fractions. While they do this she will give a problem for remainder to work on scrap paper. Let some pupil suggest fractions containing letters in denominators, for pupils enjoy making their own problems, thus getting on the inside of it all. From the problems now on the board, a plan will be made orally.

The teacher will have one of the best pupils work out a type problem writing the reasons for each step.

C. Assignment

1. Perform orally the additions on p. 144, Nos. 1-10.¹
2. Write out problems 1-10, p. 145.
3. Be able to state clearly what you are doing.

SECOND DAY

I. Objectives

A. Ultimate

(Same as for first day.)

B. Immediate

1. Skill in adding fractions with monomial denominators.
2. An understanding of how to add fractions having polynomial denominators.

II. Learning exercises

A. Review

1. Questions on the oral problems, or on the ten written problems assigned yesterday may be asked by the pupils. Difficulties are to be met by pupils who volunteer, unless the teacher sees need of calling

¹Text: *First Course in Algebra*.—Rietz, Crathorne, and Taylor.

on some particular pupil. (*Not more than 10 minutes.*)

2. Drill on simple addition problems. *Oral Algebra* by Golden and Fenno, pages 50-51. Teacher skips around in list and in class so that each student is thinking of same problem, not of the one ahead. Name problem and allow from 3 to 5 seconds to elapse, then name pupil. Make it snappy. See that the poorer students get at least two chances. (*Not more than 15 minutes.*)

B. Recitation

1. Teacher asks for fractions with polynomial denominators, calls for suggestions in the work and gets a student to show how it is worked.
2. Board work, on problems of type assigned for tomorrow. Teacher dictates a problem, watches the work of as many as she can, making suggestions by question rather than definite statement. To avoid being kept busy by one or two poor students, one or two of the better students, on completion of a problem, may be assigned to assist another pupil.

C. Assignment (Not given.)

SUBJECT: *English Literature*¹

GENERAL TOPIC: *Modern Drama*

I. Objectives

A. Ultimate

Appreciation of the modern English drama as a unit in itself and as a link in the chain of English drama development.

B. Immediate

Items of information relative to characteristics and

¹Adopted from a plan prepared by L. McHarry, published in MONROE, WALTER'S.—"The Planning of Teaching." Bureau of Educational Research, Circular No. 31. University of Illinois Bulletin, Vol. 22, No. 7. Urbana: University of Illinois, 1924, 41 pp.

tendencies of the modern English drama. Many of these items are implied in the learning exercises.

II. Learning exercises

A. Review¹

The teacher draws a long line across the blackboard and places the date 55 B. C. at one end and the date, 1924, at the other end. A student is designated to fill in the dates needed to divide the line into the periods of English literature. A second student is designated to put in the important dates and facts that have been noted thus far in our study of the development of the English drama.

B. Recitation

Who will add a new date to our outline on the board? Student volunteers and puts 1890 with name of Ibsen on the line.

The students are asked to give the lists of characteristics for the various tendencies of the modern drama as they have recorded them on their outlines. Sufficient repetitions are made to be sure that these are definitely enough in mind to insure intelligent discussions during the next few days.

The teacher calls for volunteers to name movies they have attended and to prove their tendencies by reference to these characteristics.

Several students have read *The Servant in the House* for outside reading. We have read *Hamlet* in class. A brief contrast of the themes, characters, memory lines, and plots of these plays brings out the differences between the modern and older dramas.

¹The following assignment was made at the preceding meeting of the class.

Read Miss Rich's discussion of the characteristics and tendencies of the modern drama. (This exercise refers to the textbook used by the class.) What do you think she means by tendency? Make an outline of graphic nature, showing characteristics of each tendency and an example of each. Memorize the new date and the facts connected with it. Which plays mentioned by Miss Rich have you seen acted? Do you agree with her classifications? Which movies have you seen that would illustrate each type of modern drama? Read before Thursday any one-act play from our library shelves. Thursday's class time will be given over to reports upon these plays.

As a summary the teacher gives rapidly a list of drama characteristics and asks students to name the tendencies back of these and plays to illustrate them.

C. Assignment

Read the play, *The Family's Pride*. Text: pp. 321-25. Have you read or seen any other play by Gibson? Miss Rich had many plays to choose from. Why did she choose just this play for her text? Which tendency of the modern drama predominates in this play? Prove your answer. Make a definite statement of the theme of the play. Make a study of the dramatic situations. Is the one-act form fitted to the theme and tendency of this play? Give reasons for your answer.

SUBJECT: *General Science in the Ninth Grade*.¹

GENERAL TOPIC: *Weather*

I. Objectives

A. Ultimate

1. Ability to read and use weather maps and reports.
2. Ability to converse intelligently about the work of the United States Weather Bureau.

B. Immediate

1. Understand meaning of terms: isobar, isotherm, thunderstorm, windstorm, hurricanes, tornadoes, cyclones, anti-cyclones, "high," "low," forecasting.
2. Understand meaning of symbols used on a weather map.
3. Know paths of storms across the U. S.
4. Know number of days average storm takes to cross the United States.
5. Tell from a weather map: temperature, wind di-

¹This plan was prepared under the writer's direction by Leigh V. Finley, a student in one of his classes during the summer session of 1926. Several minor changes have been made in editing the plan for publication. The plan is estimated to cover the work of three days. Text: VANBUSKIRK and SMITH. *The Science of Everyday Life*. Boston: Houghton Mifflin Company, 1919, 1925 edition.

rection, barometric pressure, sky conditions, and if rain fell at a given place on date map was printed.

6. Know location of nearest branch weather station.
7. Know relation between temperature and pressure.
8. Know changes of weather connected with passing of storms.
9. Know how weather reports are gathered.
10. Know how weather maps are made from data gathered.
11. Know how weather is forecast from data collected.
12. Know value of weather reports to various lines of business and industries.
13. Know location of Weather Bureau room.
14. Know number of branch stations, special stations, and volunteer stations.

II. Learning Exercises

Homework (*Outside of class*)

1. Learn meaning of terms: isobar, isotherm, "high," "low," thunderstorm, windstorm, tornado, hurricane, cyclone, anti-cyclone, forecasting.
2. Learn meaning of continuous lines on weather map, of dotted lines, light arrows, circles and their shadings, shaded portions of the map.
3. Copy on an outline map of the United States the main paths of storms across the country.
4. Find out how long it takes the average storm to cross the nation.
5. From the weather map given you, find out and record on a sheet of paper the temperature, direction of wind, barometric pressure, and sky condition of this locality on the date the map was printed. Record whether it rained or not.
6. What is the location of the nearest branch weather station?
7. Where is the Weather Bureau located?
8. How many branch weather stations are there in the United States? How many special stations? How many volunteer stations?

9. Write a paper on one of the following topics (200-500 words): (*Roughly divide class so that some members are reporting on each of the three topics below.*)
 - "How weather reports are gathered and maps are made."
 - "Value of weather reports to Agriculture, Commerce, and Business."
 - "Where weather maps, reports, and forecasts may be secured and how."
10. Gather data so as to be able to explain in class the answers to these questions:
 - What relation is there between temperature and pressure?
 - What changes of weather are connected with storms?
 - How does the knowledge of wind conditions, barometric pressure, and temperature of the United States enable the weather experts to forecast the weather?

Classwork

1. Using your own map find answers to questions under problem 9 page 111. Write out answers to the four questions in the summary on page 113.
2. Divide class into three groups and put a group to work on one of each of the three problems (experiments) II, 12, 10, pp. 114-115.
3. Listen to a reading of the best reports under No. 10 above.
4. Discuss orally problems under No. 11 above.

LEARNING EXERCISES FOR THE READER

1. Read the principles relating to devising and selecting learning exercises on page 45 f. What elaborations or improvements can you suggest?
2. Do exercises 1, 8, 11, and 13 on pages 82-3.
3. In devising and selecting learning exercises, the teacher should evaluate them by considering: (1) the nature of the ensuing activities, and (2) the probable outcomes of these activities.

For each of the learning exercises given below describe the ensuing activities and the probable outcomes. Be as specific as possible.

- a. A student is given a plant and requested to examine it as to form of roots, stem and leaves, arrangement of flower parts, etc.
- b. A request to listen to a lecture on "the forest-grown tree versus the open-grown tree in the production of high-grade lumber."
- c. A request to run a germination test on a sample of seed wheat.
- d. On a map of Europe show the boundaries of the various states under the agreements made at the Congress of Vienna in 1815.
- e. Solve the following quadratic equations by the formula method.

$$(a) 2x^2 + x - 1 = 0$$

$$(b) 3x^2 + 8x = 3$$

$$(c) 7x^2 + 7x + \frac{1}{4} = 0$$

- f. Write an exposition of the phrase "good body mechanics."
 - g. Draw a sketch of two neurones showing the synaptic connections.
 - h. Circumscribe a triangle about a circle given the radius of the circle and the base of the triangle. (Assume that this is a "new" exercise.)
 - i. Expand $(x + a)^2$, $(x + a)^3$, $(x + a)^4$, $(x + a)^7$, and then formulate a general rule regarding the expansion of a binomial.
 - j. Explain the fact that magnesium ash is heavier than magnesium but wood ash is lighter than wood.
4. Criticize the following as statements of immediate objectives. In doing it, recall the descriptions of the different rubrics of controls of conduct in Chapters V, VI, and X.
- a. To learn the principles underlying the development habits.
 - b. A general acquaintance with the map of Europe.
 - c. Reconstruct the lives of the people.

- d. To lead from the concrete facts of history to general principles.
- e. Ability to tabulate neatly and accurately the results of an experiment.
- f. Ability to recognize hydrogen and general familiarity with its acid-forming qualities and practical uses as a catalyzer, etc.
- g. Ability to solve problems such as the following.
- h. Ability to see chemistry in its proper relations to and connections with the other physical sciences.
- i. Knowledge of some of the greatest authors, their lives and works and the reasons for their importance.
- j. Understanding of the structure and style of the main literary types.
- k. To instill a liking for grammatically correct language.
- l. To supply pupils with an effective tool of thought and expression.
- m. To present to the student noble ideals.
- n. Ability to read understandingly the given data of any problem.
- o. Ability to think quantitatively.
- p. Ability to define such terms as matter, mass, force, velocity, acceleration, horse-power, liquid, gas, etc.
- q. Ability to state and explain such laws as law of falling bodies, Newton's laws of motion, Boyle's Law, and moments of forces.
- r. Ability to think qualitatively.
- s. Ability to use imaginary numbers.
- t. Ability to classify, as to time of occurrence, most of the facts of modern history around certain central dates such as 1789, 1815, etc.
- u. Ability to see the relation between the industrial revolution and the rise of socialism.
- v. Ability to use language as an effective tool of thought and expression.
- w. Ability to converse with educated people about authors of literary writings.
- x. Ability to distinguish writings that are really good from those that are trivial.

- y. Ability to use the knowledge of the principles affecting wheat production.
 - z. Ability to state in one's own words Thorndike's theory of transfer of training.
5. Prepare a list of questions which might be used by a high-school teacher as a basis for a comprehensive self-analysis. A few questions are given as illustrations.
- a. Just what is my aim for to-day's lesson?
 - b. Is the assignment properly adjusted to the individual differences of the students?
 - c. Do I ask good questions?
 - d. Am I accustomed to repeat students' answers?
 - e. Do I accept answers that are not clearly expressed and read into them the meaning the student ought to have?
6. Prepare plans for the complete teaching of two instructional units in your subject of specialization. Follow the form suggested on page 544. Exercise special care in formulating the immediate objectives.
7. Examine the learning exercise in two or more high-school texts and evaluate them with reference to appropriateness. Select texts for some subject other than mathematics. For a report of a suggestive investigation see MOORE, NELLE E.—“An Analysis of Study Questions Found in Textbooks for the Intermediate Grades.” *Elementary School Journal*, 27:194-208, November, 1926.

INDEX OF
AUTHORS AND TOPICS

AUTHOR INDEX

- ADAMS, JOHN, 65, 158.
 ALLEN, I. M., 410.
 ANIBEL, FRED G., 165.
 AYER, ADELAIDE M., 206, 209.
- BAGLEY, W. C., 30, 73, 97, 109, 110,
 125, 134, 138, 150, 151, 152, 154,
 167, 181, 190, 247, 318, 343, 348,
 371, 376, 381, 382, 393, 450, 466.
 BAGLEY, W. C., AND KEITH, J. A. H.,
 1, 30, 146, 313, 315, 324, 380
 BAILEY, W. A., 69.
 BOBBITT, FRANKLIN, 24, 33, 36, 56, 57,
 58, 317, 551.
 BODE, BOYD H., 326.
 BRESLICH, E. R., 414.
 BRIGGS, THOMAS H., 325.
 BRINKLEY, S. G., 497, 498.
 BROWNELL, W. A., 408.
 BRYAN, W. L., AND HARTER, NOBLE,
 120.
 BURR, A. W., 406, 410.
 BURTON, WILLIAM H., 544.
 BUSWELL, G. T., AND JUDD, CHARLES
 H., 194, 199, 208.
- CAMERON, E. H., 7, 32, 33.
 CARTER, R. E., 428.
 CARTER, R. E., AND MONROE, WALTER
 S., 255, 274.
 CHARTERS, W. W., 57, 90, 93, 317, 326,
 328, 450, 544.
 CHASE, SARA E., AND HOSIC, JAMES
 F., 450
 CHASSEL, CLARA F., AND UPTON,
 SIEGFRIED, M., 316.
 COLE, THOMAS R., 411.
 COLLINGS, ELLSWORTH, 453, 454, 457.
- COLVIN, CARL, AND STONE, C. W., 220.
 COLVIN, S. S., 167, 181, 246, 343, 355,
 357, 359, 376, 381, 541, 549.
 CORNMANN, O. P., 119.
 COUNTS, GEORGE S., 386.
 COURTIS, S. A., 467.
 CRAWFORD, C. C., 180.
 CROXTON, W. C., 555.
 CURTIS, FRANCIS DAY, 204, 321.
- DAILY, BENJAMIN W., 251, 264, 328.
 DALMAN, MURRAY A., 67, 143, 402.
 DE VOSS, J. C., MONROE, WALTER S.,
 AND KELLY, F. J., 386, 391, 491, 522.
 DEWEY, EVELYN, 372.
 DEWEY, JOHN, 4, 149, 155, 239, 313,
 341, 450.
 DOUGLASS, H. R., 432.
 DOWNING, ELLIOT R., 165.
- ELLIOTT, E. C., AND STARCH, DANIEL,
 490.
 ENGELHARDT, MAX D., 123.
- FINLEY, LEIGH V., 562.
 FLEMMING, CECILE WHITE, 379.
 FREEMAN, F. N., 24, 33, 73, 433.
- GAISER, PAUL F., 386.
 GATES, A. I., 5, 7, 33, 38, 81, 151, 459.
 GERMANE, CHARLES E., 214.
 GOOD, CARTER V., 219.
 GRAVES, F. P., 435.
 GRAY, W. S., 191, 192, 194.
- HALL-QUEST, A. L., 139, 393, 413.
 HARRIS, G. L., 409.
 HARTER, NOBLE, AND BRYAN, W. L.,
 120.

- HELSETH, INGA OLLA., 264, 330, 426.
 HERRIOTT, M. E., AND MONROE, WALTER S., 257.
 HILLIS, C. C., AND SHANNON, J. R., 415.
 HINES, H. C., 413.
 HOSIC, JAMES F., AND CHASE, SARA E., 450.
 HOTCHKISS, E. A., 454.
 HUEY, E. B., 154, 211.
 HUGHES, W. H., 319, 401.
 INGLIS, ALEXANDER, 157, 233, 311, 406.
 IRION, THEO. W. H., 207, 231, 384.
 JACKMAN, E. D., 373.
 JAMES, WILLIAM, 144, 164.
 JOHNSON, DOROTHY, AND MILLER, H. L., 403.
 JUDD, CHARLES H., 73, 191, 324.
 JUDD, CHARLES H., AND BUSWELL, G. T., 194, 199, 208.
 KANDEL, I. L., 16.
 KEITH, J. A. H., AND BAGLEY, W. C., 1, 30, 146, 313, 315, 324, 380.
 KELLEY, T. L., 340.
 KELLY, F. J., 490.
 KELLY, F. J., MONROE, WALTER S., AND DEVOSS, J. C., 386, 391, 491, 522.
 KILPATRICK, W. H., 160, 400, 448, 460.
 KORNHAUSER, ARTHUR W., 422.
 LANGLIE, T. A., AND PATTERSON, DONALD G., 497, 517.
 LINKE, EDITH A., 469.
 LYMAN, R. L., 217, 222, 269, 289, 422.
 MCHARRY, L., 560.
 MCMURRY, CHARLES A., 164, 167, 181, 188, 542, 544.
 MCMURRY, FRANK M., 167, 181, 188, 542, 544.
 MELTZER, HYMAN, 204.
 MERRIAM, EUGENE E., 411.
 MERRIAM, JUNIUS L., 119.
 MILLER, H. L., 375, 406, 412.
 MILLER, H. L., AND JOHNSON, DOROTHY, 403.
 MOHLMAN, DORA KEEN, AND MONROE, WALTER S., 289, 384, 385, 420.
 MONROE, WALTER S., 193, 381, 485, 487, 488, 555, 558, 560.
 MONROE, WALTER S., AND CARTER, RALPH E., 255, 274.
 MONROE, WALTER S., DEVOSS, J. C., AND KELLY, F. J., 386, 391, 491, 522.
 MONROE, WALTER S., AND HERRIOTT, M. E., 257.
 MONROE, WALTER S., AND MOHLMAN, DORA KEEN, 289, 384, 385, 420.
 MONROE, WALTER S., AND SOUDERS, LLOYD B., 498.
 MOHR, LOUISE, AND WASHBURNE, C. W., 401.
 MOORE, NELLE E., 567.
 MOREHOUSE, FRANCES M., 343.
 MORRISON, H. C., 62, 66, 130, 406, 412.
 MORTON, ROBERT L., 490.
 MOSSMAN, LOIS COFFEY, 544.
 NEILSON, C. H., 409.
 O'BRIEN, J. A., 221.
 ODELL, C. W., 418 f, 515, 522.
 PARKER, S. C., 1, 33, 35, 36, 127, 130, 163, 210, 244, 264, 351, 544.
 PARKHURST, HELEN, 372.
 PATTERSON, DONALD G., AND LANGLIE, T. A., 497, 517.
 PENDLETON, CHARLES, AND WASHBURNE, C. W., 401.
 PERRY, JUNIOR, ARTHUR C., 343.
 PETERSON, JOSEPH, 194.
 POWERS, S. R., 204, 205, 382.
 PRESSEY, LUELLA C., 205.
 REAGAN, G. W., 115.
 REAVIS, W. C., 413.
 REEDER, E. H., 415.
 REEDER, JOHN C., 340.
 ROBBINS, CHARLES A., 372.

- ROWE, STUART H., 126, 128, 150.
RUCH, G. M., 497, 514.
RUGG, H. O., 340.
SEARCH, P. W., 400.
SHANNON, J. R., AND HILLIS, C. C.,
415.
SHEPERD, EDITH E., 286.
SHUTTLEWORTH, FRANK K., 340.
SIMPSON, M. R., AND YOUNG, EULA,
411.
SOUDERS, LLOYD B., AND MONROE,
WALTER S., 498.
SPENCER, HERBERT, 83.
STALEY, S. C., 335.
STARCH, DANIEL, 7.
STARCH, DANIEL, AND ELLIOTT, E. C.,
490.
STETSON, PAUL C., 412.
STEVENSON, J. A., 447.
STONE, C. W., AND COLVIN, CARL, 220.
SYMONDS, PERCIVAL M., 331, 422.
TAYLOR, S. HELEN, 558.
THORNDIKE, E. L., 7, 38, 91, 126, 134,
165, 192, 193, 204, 250, 271, 332,
334, 378, 430.
TILTON, J. W., 158.
TOUTON, FRANK C., 277.
UNDERHILL, R. I., 372.
UPTON, SIEGRIED M., AND CHASSELL,
CLARA F., 316.
VOELKER, P. F., 336.
WASHBURNE, CARLETON W., 399, 401.
WASHBURNE, CARLETON W., AND
MOHR, LOUISE, 401.
WASHBURNE, CARLETON W., AND
PENDLETON, CHARLES, 401.
WEIDEMANN, C. C., 515.
WHIPPLE, G. M., 139.
WILLETT, G. W., 409.
WILSON, LESTER M., 545.
WOOD, BEN D., 490, 497, 514, 518.
YOAKAM, GERALD ALAN, 219.
YOUNG, EULA, AND SIMPSON, M. R.,
411.

TOPIC INDEX

- Abilities. *See* Controls of conduct, Specific habits, Knowledge, and General patterns of conduct.
- Achievement versus learning activity, 62.
- Adaptive controls of conduct. *See* Knowledge, and General patterns of conduct.
- Apperception, 164.
- Assignments, as a directive procedure, 414 f; time of making, 418 f; *See* Lesson plans, and Learning exercises.
- Assignment method, 5, 85, 450 f; merits of, 456.
- Assignment outlines, 417.
- Attitudes, 318 f; scientific, 221; *See* General patterns of conduct.
- Batavia Plan, 393.
- Brief, nature of, 291 f.
- Cardinal principles of secondary education, 51.
- Classes, plans of conducting, 344; requirements for efficient conduct, 345 f.
- Class period, functions of, 346.
- Co-efficient of reliability, 488.
- Complete measurement, 476.
- Completion test, 521.
- Comprehending products of thought, 35, 193 f, 217.
- Constant error, 487.
- Controls of conduct, types of, 30 f. *See* Specific habits, Knowledge, and General patterns of conduct.
- Courtesy, as a general pattern of conduct, 317.
- Cramming, 439.
- Dalton Plan, 372; variations of, 373.
- Diagnosis, 141 f, 429, 434.
- Diagnostic measurement, 475.
- Differentiated assignments, 394 f.
- Discipline of natural consequences, 110.
- Disorder, correction of, 358 f.
- Drill, 36, 131 f; in reviews, 434, 437.
- Drill versus use of knowledge, 244.
- Emotional activity, 37.
- Emotional element in general patterns of conduct, 331 f.
- Emulation, 108.
- Errors, types of, 486 f; causes of, 489.
- Essay type of examinations. *See* Written examination.
- Estimates, improvement of, 503 f.
- Examinations, importance of, 531 f.
- Examination papers, marking of, 490, 509 f.
- Exercises. *See* Learning exercises.
- Expression, characteristics of, 294 f; evaluation of, 308 f.
- Expression as a learning activity, 36, 282.
- Fact, definition of, 152, 158.
- Fact question, 240.
- Final grades, calculation of, 530.
- Fixed controls of conduct. *See* Specific habits.
- Formal discipline, 73, 324.
- Generalizing, 34, 166 f.
- General measurement, 475.
- General methods, scope of, 1, 11 f.
- General methods versus special methods, 10.

- General patterns of conduct, nature of, 31, 314 f; means of motivation, 105 f; expressed as codes, 322; adaptable quality of, 323; steps in teaching, 326; considered as by-products, 326 f; affected by methods of instruction, 326, 335; evaluation of, 339.
- Grades distinguished from scores, 501.
- Habit formation, laws of, 125.
- Herbartian five formal steps, 167, 181, 187, 381, 542, 545.
- High school students, preparation in silent reading, 203 f.
- Idea, definition of, 151; acquisition of, 152; development of, 296.
- Ideals, 315; types of, 324; engendering of, 328 f.
- Immediate objectives, 53 f, 56; classification of, 60 f; statement of, 66 f, 102 f, 550; a means of motivation, 102 f.
- Immediate objectives of problem solving, 245 f.
- Indirect measurement, 476.
- Individual differences, adaptation to, 45, 71 f, 390 f; types of, 378 f; range of, 382 f.
- Individualized instruction, 398 f.
- Information, collection of, 287 f.
- Instructional activities, balance of, 375, 440.
- Intelligence, measurement of, 386 f.
- Knowledge, nature of, 30, 149 f; symbols of, 153 f; dynamic, 159, 161; evaluation of, 188, 155 f, 230 f, 263 f, 273 f; opportunities to use, 247, 250 f; application of, 35, 238 f; development of, 167 f; "short cuts" in acquiring, 169; illustration of development, 182 f; exercises for development, 180 f.
- Knowledge versus specific habits, 157 f.
- Laboratory method, 344, 372, 399.
- Laws of learning, 38, 125.
- Learning, art of. *See* Study habits.
- Learning activity, 26; basis of, 5, 28; types of, 31 f; balanced ration of, 229 f, 284, 375.
- Learning process, 1.
- Learning exercises, 24; construction of, 45 f; to give a correct start, 127 f; for making responses automatic, 131 f; for perceptual experiencing, 176; to supplement perceptual experiencing, 179; leading to development of knowledge, 180; for reading, 211; to supplement reading, 213, 229; for use of knowledge, 247 f; types of thought questions, 254 f; for expression, 283 f; for engendering general patterns of conduct, 328 f.
- Lecture-demonstration, merits of, 165.
- Lesson plans, 542 f; illustration of, 555 f; abbreviated, 554.
- Manuscript, revision of, 305.
- Man-to-man comparison scale, 505.
- Mastery, 64, 223.
- Measurement, meaning of, 473; relation to objectives, 478. *See* Diagnostic measurement, General measurement, Complete measurement, Sample measurement, Indirect measurement, and Prognostic measurement.
- Measurement procedures, types of, 492 f.
- Measurement performances, 479 f.
- Mechanized routine, 347, 351.
- Mnemonic devices, 135.
- Motivation, basis of, 86; types of, 90.
- Multiple-choice examinations, 518.
- Need, definition of, 90; creation of, 91 f.
- New examination, 492, 496; construction of, 514 f.
- Notes, taking of, 224 f, 290.
- Normal distribution, use of, 525 f.

- Objectives. *See* Immediate objectives, Ultimate objectives.
- Objectives, implied, 75 f; hierarchy of, 54 f.
- Organizing, a learning activity, 281; opportunities for, 283.
- Outline, nature of, 291 f; used as assignment, 417; used as lesson plan, 546.
- Percept, 150.
- Perceptual experiencing, 33, 162 f; learning exercises for, 176 f, 179 f.
- Performances, significant characteristics of, 503 f.
- Pretest, 98.
- Precision of statement, 298 f.
- Probability curve, 525 f.
- Problem, nature of, 239. *See* Thought question.
- Problem solving, direction of, 261 f; outcomes of, 245 f.
- Problem method, 456.
- Prognostic tests, 388.
- Prognostic measurement, 477.
- Project, definition of, 447; types of, 448; illustrations of, 452 f.
- Project method, 5, 449 f; merits of, 456 f; relation to curriculum, 462 f; relation to level of intelligence, 464; technique of, 467 f.
- Project method and lesson planning, 540.
- Punishment, a means of motivation, 109; a corrective for disorder, 358 f; relation to the offense, 364 f; for failure to do school work, 365; types of, 366 f.
- Questions. *See* Thought questions, and Fact questions.
- Reading. *See* Silent reading.
- Reading purposes, 193 f; teacher's control of, 198 f.
- Reading to understand, 195.
- Reading for enjoyment, 197.
- Recitation method, 344.
- Reflective thinking, 242; an important distinction, 248 f; direction of, 264 f; steps of, 168; in silent reading, 193.
- Reliability, 486.
- Remedial instruction, 142, 432 f.
- Rereading, value of, 219.
- Reviews, 433 f.
- Sample measurement, 476.
- School marks, errors in, 490. *See* Scores.
- School marks based on differentiated assignments, 395, 401 f.
- Scientific evaluation of methods, 13.
- Scientific attitude. 321.
- Scores distinguished from grades, 501, 511; translated into grades, 524 f.
- Secondary education, cardinal principles of, 51.
- Self-activity, principle of, 2, 9.
- Silent reading, 192 f; types of, 195 f; rate of, 218; ability of high school students, 203 f; exercises for, 211, 221; supplementing, 213 f, 229 f; directions for, 226 f; standardized tests, 231.
- Silent reading ability, measurement of, 207.
- Socialized recitation, 370, 456.
- Specific habits, nature of, 30, 117 f; types of, 119; illustration of, 123 f; evaluation of, 140 f.
- Sportsmanship, engendering of, 335.
- Standardized tests, usefulness of, 494 f; selection of, 522 f.
- Study, nature of, 191, 202; rules for, 139 f, 226 f, 262, 420 f.
- Study habits, 73; teaching of, 425 f.
- Subjective norms, 524.
- Supervised study, 405; types of, 408 f; techniques, 414 f.
- Teachers, training of, 15 f.
- Teacher's aim, illustrations of, 549.
- Teacher's task, 3 f, 41 f, 174 f.

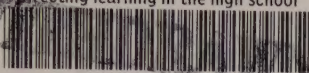
- Technical vocabulary, 125, 155, 204, 205 f, 232, 299, 301 f, 311, 510.
- Textbook, nature of contents, 198; influence of content, 39 f, 197.
- Textbook study, process of, 215 f.
- Thought question, 240; formulation of, 256 f; asking, 259; types of, 254 f; faults in answering, 274.
- Topical method, 417.
- Tracing the thinking of another person, 36, 216.
- Transfer of training, 324.
- Translating scores into grades, 424 f.
- Trend of thought, 295.
- True-false examinations, 515 f.
- Trustworthiness, engendering of, 336.
- Ultimate objectives, 52, 57 f; determination of, 57.
- Validity, 481 f.
- Values, basis of, 91; evaluation of, 92; generic, 93; intrinsic, 93; artificial, 93; appreciation of, 94 f.
- Variable error, 487.
- Vicarious experiencing, 34, 164, 215.
- Visual aids, 176, 432-33.
- Well-disciplined school, 348.
- Written examinations, merits of, 498; improvement of, 507 f, 511 f.
- Written reports, 179, 186 f; attitude of students toward, 286.
- Written work, handling of, 430 f, 535 f.

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